QUALITY TOOLS FOR THE

Aerospace Industry

Quackenbush • Doler • Recoules • Apex • Cleco • Dotco



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Quackenbush® • Doler® • Recoules® • Apex® • Cleco® • Dotco®



ISO 9001

Cooper Power Tools Division has attained ISO 9001 Quality System Certification for seven of our facilities. The driving force behind the implementation of the Quality System is the commitment "to provide our customers with the **best value delivered** by offering only products and services that meet or exceed their expectations".







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Cooper Power Tools Advanced Drilling Equipment



Our Tools Are So Much In Demand Because We Demand So Much From Our Tools

Advanced Drilling Equipment from Cooper Power Tools is the most complete and the most comprehensive line of drilling systems available to the aerospace industry.

available to the aerospace industry.

Branded under the highly respected Doler and Quackenbush names, the Cooper line represents "the best of the best," encompassing

represents "the best of the best," encompassing the premium features from a number of tool lines our company has acquired over the years. All of the tools in the Advanced Drilling Equipment line are designed to be fixture-mounted, with torque and thrust counteracted by the fixture, not by the operator.

These tools do not rely on the variable strength of manpower to push against a drill, which means they deliver greater accuracy, repeatability and consistency of hole integrity, as well as greatly reduced fatigue and chance of injury to the operator.

We have designed our tools to help you achieve optimum hole quality, including diameter, angularity and depth tolerances. Of course, the drill is but one factor that effects hole quality. The condition of the cutter, fixture, bushing in the fixture, lubrication, and the skill of the operator are major factors.

And to ensure that our tools and accessories are the best in their class, we go to extraordinary lengths

the best in their class, we go to extraordinary lengths in design, testing, manufacturing and quality control to meet or exceed the highest international standards.





today, because we will probably be riding on one of your planes tomorrow.

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Cooper Power Tools Advanced Drilling Equipment

Cooper Power Tools Advanced Drilling Equipment

Introduction

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Assuring You Of The Right Tool For The Right Application

The Advanced Drilling Equipment line has been developed to address the singular nature of achieving optimum hole quality in the aerospace industry. In most traditional industries, precision holes can

In most traditional inclustries, precision holes can be successfully drilled with a drill press or CNC machine. But because a significant number of aircraft components are too large, too complex and too irregularly shaped to be taken to a machining center, portable precision drill motors must be taken to the plane itself. It is impractical to drill precision holes in a wing, fuselage or engine nacelle any other way. The wide range of hole sizes, the critically close tolerances required of those holes and the divergent materials used in the aerospace manufacturing industry demand that these portable precision drill

industry demand that these portable precision drill

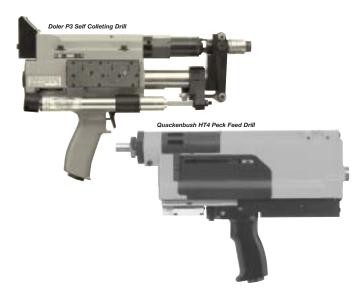
motors be available with a remarkably broad range of cutter speeds, feed rate combinations, and physical

cutter speeds, teed rate combinations, and physical properties that can accommodate virtually any work-space or application.

Responding successfully to these demands for quality and flexibility has made the Cooper Power Tools Advanced Drilling Equipment line the most impressive, and the most respected, in the business. Included are positive feed drills for deep hole drilling in fallow produced, and drift and experifications.

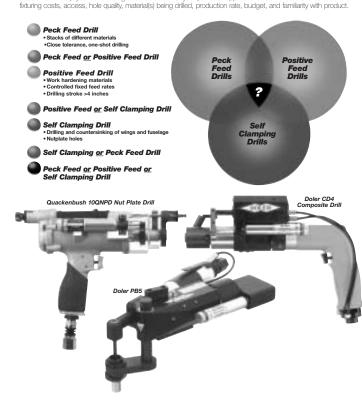
in in-line, piggyback, and right angle configurations, peck drills designed specifically to enhance hole quality when drilling through layers of dissimilar materials, and self colleting drills that are perfect for drilling smaller holes throughout the aircraft. We invite your attention to a detailed picture of the various Advanced Drilling Equipment tools and accessories in the pages that follow.

accessories in the pages that follow.



Selecting The Right Tool

The old saying, "you've got to have the right tool to do the job right", is so true in regards to advanced drilling equipment. For certain applications, as shown in the diagram below, a specific tool is required. However, other applications may be served by more than one tool. Detailed analysis by one of our experience technical assistants will help you make the right tool selection for your particular applications. Some factors to consider are



Cooper Power Tools Advanced Drilling Equipment

Introduction

Speed, Feed & Power

Please use the chart below as a Hease use the chart below as a guide only. Many variables contribute to the optimum parameters for each application. These variables include: particular material characteristics, cutter design, cutter sharpness, airline pressure and flow capacity and autre their productive thei and cutter lubrication.

All portable drilling tools have limited power and thrust. In most cases, holes over 1/2 inch diameter cannot .

6. Utilize fixtures that are secure and rigid. be produced at machine tool rates. Feed rates and/or speeds are reduced. Consult Cooper Power Tools for advise on particular applications.

For best results with your drilling system:

- 1. Maintain lubricated air to the tool with pressure of 90 psig while the tool is running.
- 2. Use high quality cutters.
- 3. Replace cutters when point dulls hole diameter generally increases, cycle times lengthen (except positive feed) and hole finish worsens.
- 4. Whenever possible, provide lubricant mist to the drill point.

- 7. Assure that accessory items are sized correctly and working properly.
- 8. Train operating personnel in the proper use of the tool.

			Drill Diameter					
		1/8	3/16	1/4	5/16	3/8	7/16	1/2
Material	Function	.125	.188	.250	.313	.375	.437	.500
Aluminum (300 SFM)	Speed (RPM)	9000	6000	4600	3600	3000	2600	2300
	Feed Rate (IPR)	.002	.003	.004	.004	.004	.004	.004
	Power (HP)	.2	.3	.6	1.0	1.5	1.8	2.0
Mild Steel (90 SFM)	Speed (RPM)	2700	1800	1300	1100	900	750	650
	Feed Rate (IPR)	.005	.005	.005	.006	.006	.006	.006
	Power (HP)	.2	.3	.6	1.0	1.5	1.8	2.0
High Strength Steel	Speed (RPM)	900	600	450	375	300	250	220
Stainless Steel	Feed Rate (IPR)	.001	.001	.001	.001	.001	.001	.001
(30 SFM)	Power (HP)	.2	.3	.6	1.0	1.5	1.8	2.0
Titanium/Inconel	Speed (RPM)	600	400	300	250	200	175	150
(20 SFM)	Feed Rate (IPR)	.002	.003	.003	.003	.004	.004	.005
	Power (HP)	.2	.3	.6	1.0	1.5	1.8	2.0

Composites

Graphite, kevlar, fiberglass, and other composite materials vary widely. Fiber, resin, processing method and type of cutting tool all affect the optimum drilling speed and feedrate. Little power or thrust is normally required, but controlled feedrates at the proper speed is mandatory, carbide or diamond cutting tools are required. Contact your material supplier or experiment with an NC Drilling Machine.

Stacks of Various Materials Use the lowest speed and feedrate of the materials in the stack. Peck feed drilling is best

Speed (RPM)

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nple: Revolutions per minute





Surface Speed (SFM)



Feed Rate (IPR)

Example: 0.002 inches per revolution = .002 IPR

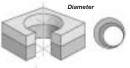


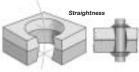
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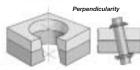
Feed Rate = Distance + Revolution

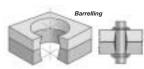
Cooper Power Tools Advanced Drilling Equipment

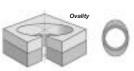
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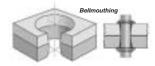












Benefits of Proper Hole Preparation

Improved Hole Quality

- Diameter tolerance
- Countersink depth tolerance
- Hole finish
- Hole straightness
- No delamination in composites
- No fiber fraying in composites
- \blacksquare No metallurgical change from excess heat

Lowered Cost Per Hole

- Reduce the number of operations for a finished hole
- Combine drilling and countersinking into one operation
- Self clamping attachments minimize hole to hole time

Reduced Inventory & Capital Investment

- Portable equipment eliminates expensive, large stationary machines
- Simultaneous drilling and countersinking reduces total equipment requirements
- Self clamping significantly reduces fixturing costs
- Modular designs reduce the number of complete backup units

Reduced Safety Hazards

- Less operator contact
- Drill bit control through nosepieces and fixtured
- All reactions of the drilling process are absorbed by the fixture and drilling equipment

The Total Solution

The total solution from Cooper Power Tools includes not only a complete line of quality industrial tools and accessories but also a professional engineering and product support staff to help customize each tool to specific application requirements. All are as close as a telephone or e-mail.

Cooper Power Tools maintains company-owned Service Centers in strategic locations throughout the world, staffed with professional tool repair technicians who use genuine Cooper Power Tools parts and who are outfitted with the very latest in testing,

calibration and inspection equipment.
Each tool that is returned to a customer from one of our Service
Centers carries with it a warranty
that is Cooper Power Tools' assurance that it will perform just like it
did when it was purchased new.

Our support personnel are fully capable of helping to diagnose problems and promptly recommend solutions. Our complete line of tools are carefully designed and built from the finest materials available in order to provide years of trouble free service. But, as with any piece of equipment, service problems can occur. All tools are designed to be easy to service ... that is, of course, with properly trained personnel.

To facilitate quick repairs, and limit downtime ...

Cooper Power Tools conducts training seminars covering all aspects of every tool we make.

Introductory training seminars are designed to fully acquaint students with the entire line of tools and their fundamental operation. Advanced training seminars, which are often tailored to individual needs, are designed to hone the skills of the experienced student. Hands-on experience, with an emphasis on troubleshooting and repairing, are the focus of this training.

Service literature, product information, brand catalogs and FAQs are also available around the clock on the Web. Just access www.cooperpowertools.com for the latest information available about any of our products and services.





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Note: All locations may not service all products. Please contact the nearest Sales & Service Center for the appropriate facility to handle your service requirements.

Dallas, TX Cooper Power Tools Sales & Service Center 1470 Post & Paddock Grand Prairie, TX 75050 Tel: (972) 641-9563

Fax: (972) 641-9674 Detroit, MI

Detroit, MI
Cooper Power Tools
Sales & Service Center
4121 North Atlantic Blvd.
Auburn Hills, MI 48326
Tel: (248) 391-3700
Fax: (248) 391-6295

Houston, TX Cooper Power Tools Sales & Service Center 6550 West Sam Houston Parkway North, Suite 200 Houston, TX 77041 Tel: (713) 849-2364 Fax: (713) 849-2047

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Lexington, SC

Cooper Power Tools 670 Industrial Drive Lexington, SC 29072 Tel: (800) 845-5629 Tel: (803) 359-1200 Fax: (803) 359-0822

Brazil

Cooper Tools Industrial Ltda.
Av. Liberdade, 4055
Zona Industrial - Iporanga
18087-170 Sorocaba, SP Brazil
Tei: (011) 55 15 238 3929
Fax: (011) 55 15 228 3260

Canada CooperTools Sales & Service Center 5925 McLaughlin Road Mississauga, Ont. L5R 1B8

Canada Tel: (905) 501-4785 Fax: (905) 501-4786

China

Cooper (China) Co., Ltd. 18th Floor Yu An Building 738 Dongfang Road Pudong, Shanghai 200122 China Tel: 011 8621 5111 5300 Fax: 011 8621 5111 8446

France

Cooper Power Tools SAS Recoules Operation Recoules Operation
Zone Industrielle
BP 28
Avenue Maurice Chevalier
77831 Ozoir-la-Ferrière Cede
France
Tel: 011 33 1 64 43 22 00
Fax: 011 33 1 64 40 17 17

Germany

Cooper Power Tools GmbH & Co. Postfach 30 D-73461 Westhausen Tel: +49 (0) 73 63-8 10 Fax: +49 (0) 73 63-8 12 22

Mexico

Coper Power Tools de México S.A. de C.V. Libramiento La Joya Esquina Av. Polítecnico Y Calle San Blas Bodega #2, Col. Barrio San Jose Cuautitlan, Edo. de México 54870

Tel: +52-55-5899-9510 Fax: +52-55-5870-5012

Cooper Power Tools Is On The Web!

Cooper Power Tools is pleased to unveil a complete resource for power tools on-line. <u>www.cooperpowertools.com</u> offers product information, service literature, brand catalogs, press releases and more. A dominant source of information, the Cooper Power Tools' web site is your source for application solutions on-line.



Making your job easier is our goal!

You can access service literature anytime. Choose a category such as Assembly Tools or Material Removal Tools from the main menu and then click on the brand you're looking for. You'll be on your way to any current service literature you need, whether it's Doler, Quackenbush, Dotco or any of our power tools' brands. Up-to-date product catalogs are also available online providing you

with current information on our broad product line. Even Material Safety Data Sheets (M.S.D.S.) for Safety and Disposal Information are available on our website.

It's simple!

Our Customer Service section provides you with information such as answers to frequently asked questions or contact phone numbers and addresses for your area of the country. You can learn more about Cooper Power Tools in the *About Us* section or browse through the *What's New* information to learn how Cooper Power Tools continues to be your source for solutions.



For even faster searches, you can go direct to a brand site by simply entering the brand name.

www.dolertools.com or www.quackenbushtools.com takes

What is the future of $\underline{\textit{www.cooperpowertools.com}}?$ A dynamic site continuing to focus on your need for up-to-date information on the latest Cooper Power Tools' offerings that you can access any-time you need...twenty-four hours a day, seven days a week!



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Warranty

Cooper warrants products and parts sold by it, insofar as they are of its own manufacture, against defects of material and workmanship, under normal use and service in accordance with its written instructions, recommendations, and ratings for with its writter instructions, recommendations, and ratingly installation, operation, maintenance, and service of products, for a period of ONE YEAR FROM THE DATE OF INITIAL USE, BUT IN NO EVENT SHALL THE WARRAINTY EXCEED 24 MONTHS FROM DATE OF DELIVERY TO DISTRIBUTOR. 24 MONTHS FROM DATE OF DELIVERY TO DISTRIBUTION.

Proof of Purchases with shipment date must be furnished by the user to validate the warranty. This warranty applies only to products manufactured by Cooper and specifically excludes products manufactured by others. Products not manufactured by Cooper are warranted only to the extent and in the manner warranted to Cooper by the manufacturer and then only to

the extent Cooper is able to enforce such warranty. Cooper's warranty with respect to products manufactured by it is limited to the repair or replacement, as Cooper may elect, of any defective part regarding which the Distributor has given 5 days written notice from the discovery of such defect. Installation and transportation costs are not included. Cooper shall have the option of requiring the return to it of the defective material, transportation prepaid, for inspection. No allowance will be made for repairs without Cooper's approval. COOPER MAKES NO OTHER WARRANTY OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, AND HEREBY DISCLAIMS ALL WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Lubrication Products

Cooper Power Tools' products are classified as non-hazardous manufactured items, defined in the OSHA 1910.1200 Hazard Communication Standard as "Articles". These products, under conditions of normal use, do not release or cause exposure

conditions of normal use, do not release or cause exposure to a hazardous chemical. Under normal conditions of use, lubrication products sold separately for or used within these tools should not cause an exposure hazard. Refer to the Material Safety Data Sheet (M.S.D.S.) for Safety and Disposal Information. M.S.D.S. sheets are available upon request from Cooper Power Tools or on

ur website at www.cooperpowertools.com.
Cooper is also aware of, and complies with, the provisions

of section 611 amendments to the Clean Air Act of 1990. No ozone depleting chemicals have been used in the manufacture

ozone depleting chemicals have been used in the manufacture of our products. If you resell or distribute these products, you have the responsibility for ensuring that the Material Safety Data Sheets are provided to the purchaser. Proper lubrication is essential to the economical operation of pneumatic and electric tools. Cooper Power Tools perform better and their file is extended by using the recommended lubricants. All lubricants that are listed in the accessory section of this exhalon have undercone extensive testing and are tion of this catalog have undergone extensive testing and are recommended for use with Cooper Power Tools products.

Safety Recommendations - Safe Drilling Practices

For your safety and the safety of others, read and understand

Always wear personal protective equipment



For additional information on eye protection, refer to Federal CSHA Regulations, 29 CFR, Section 1910.133, Eye and face Protection, and ANSI 287.1, Occupational and Educational Eye and Face Protection. This standard is available from the American National Standards Institute, Inc., 11 West 42nd Street, New York, NY 10036.

Hearing protection is recommended in high noise areas (above 85 dBA). Close proximity of additional tools, reflective surfaces, process noises, and resonant structures can substantially contribute to the sound level experienced by the operator. For additional information on hearing protection,

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refer to Federal OSHA regulations, 29 CFR, Section 1910.95, Occupational Noise Exposure and American National Standards Institute, ANSI S12.6, Hearing Protectors.



Drilling operations may produce hazardous fumes and/or dust. To avoid adverse health effects utilize adequate ventilation and/or wear a respirator. Read the material safety data sheet of any cutting fluids or materials involved in the drilling process.

Follow good machine shop practices. Rotating shafts and moving components entangle and entrap, and may result in serious injuries. Never wear long hair, loose fitting clothes, gloves, ties, or jewelry when working with or near a drill of any type.

Safety Labels. The safety label found on our Advanced Drilling Equipment are essential parts of the product. Labels should not

the product. Labels should not be enrowed. Labels should be checked periodically for legibility. Replace safety labels when missing or when the information can no longer be read. Replacement labels can be ordered using the part numbers found in each respective too's Operating instructions and Service Manual.

MARNING

AWAINING: Some non-ferrous metal chips (or dusts) are combustible. Examples: Aluminum, magnesium, titanium, and zirconium. See the material safety data sheets for combustibility of materials drilled. Never collect spark generating material with combustible material. Examples: Collecting both steel and aluminum or steel and titanium.



Our Advanced Drilling Equipment tools are often used with our Advances in the second principle of the second pri



Due to the multitude and variety of tooling applications, the user's methods engineering, standard tooling engineering, and/or safety engineering departments, etc., must consider any entrapment and entanglement hazards that may be associated with each specific application and provide adequate operator protection from inadvertent contact with any moving components. Spindle guards are available in one inch increments for all of our Advanced Drilling Equipment right angle drills, and should be used to cover any exposed spindle.

Our Advanced Drilling Equipment tools are designed to operate Our Advanced Drilling Equipment tools are designed to operation on 90 psig (6.2 bar) air pressure. Excessive air pressure can increase the loads and stress on tool parts and drills, and may cause breakage. **Higher air pressure can also increase the sound level of the tool.** Installation of a filter-regulator-lubricator in the air supply line ahead of the tool is recommended. The use of a quick disconnect or self-relievin valve within reach of the user of the tool is highly recommended.

Before connecting the tool with a trigger to the air supply, check the throttle for proper operation (i.e. throttle valve moves freely and returns to closed position). Before removing a tool from service or changing drill bits, make sure the air line is shut off and drained of air by using the self-relieving valve. This will prevent the tool from operating if the throttle is accidentally engaged. Also, make sure the chuck key or drill drift is removed before operating.

A CAUTION Cutting tools used with our Advanced Drilling Equipment tools are sharp. Handle them carefully to avoid injury.

A CAUTION Check the means for mounting the drill the tooling fixture or jig. Lock screws, lock lines, and bushing must be in good condition and securely installed. Before operating, be sure the nose piece is properly locked in the fixture. Positive feed drills can exert high torques and high trust leads. If failure of the lock screws, lock lines, or drill times, or drill bushing occurs, the drill may suddenly spin and back away from the drill fixture.



Keep fingers and hands away from the slots in the tool nose at all times. Rapid spindle retraction occurs automatically on some models after drilling cycle and can be activated manually, even with the air supply disconnected, on other models. Most nose pieces used with positive feed drills are slotted for visibility and access to the chuck and cutter. Because the spindle retracts at a much faster rate than it feeds, care should be taken to avoid entrapment.



The clamping and feed mechanisms of our self-colleting drills can move when air supply is connected or disconnected. To avoid injury, keep fingers and hands away from the clamping and feed mechanism of the tool when handling or operating. The clamping and feed mechanism of our nut plate drills is

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Safety Recommendations - Safe Drilling Practices

covered by a clear polycarbonate guard for visibility. The clamping and feed mechanism can also move when the air supply is connected or disconnected. To avoid injury, keep fingers and hands away from these areas when handling or operating these tools and **keep the guard in place**.

WARNING

Before starting the tool, the collet and mandrel of our Advanced Drilling Equipment tools must be inserted into a properly sized pre-drilled hole of proper material thickness. An improperly sized pre-drilled hole prevents the mandrel from engaging the collet and could result in silppage of the tool. An improperly selected collet and mandrel can also result in silppage of the tool.



Repetitive work motions and /or vibration Hepettitive work motions and /or vibration may cause injury to hands and arms. Use minimum hand grip force consistent with proper control and sate operation. Keep body and hands warm and dry. Avoid anything that inhibits blood circulation. Avoid continuous vibration exposure. Keep wrists straight. Avoid repeated bending of wrists and hands.

Some individuals may be susceptible to disorders of the hands and arms when performing tasks consisting of highly repetitive motions and/or exposure to extended vibration. repetitive motions and/or exposure to extended vibration. Cumulative trauma disorders such as carpal tunnel syndrome and tendonitis can be caused or aggravated by repetitious, forceful exertions of the hands and arms. Wibration may contribute to a condition called Raynaud's Syndrome. These disorders develog gradually over a period of weeks, months, and years. It is presently unknown to what extent exposure to vibrations or repetitive motions may contribute to the disorders. Hereditary factors, vasculatory or circulatory problems, exposure to cold and dampness, diet, smoking and work practices are thought to contribute to the conditions.

and work practices are thought to contribute to the conditions. Operators should be made aware of the following symptoms and warning signs so that a problem can be addressed before it becomes a debilitating injury. Any user suffering prolonged symptoms of tingling, numbrases, blanching of fingers, clumsiness or weakened grip, nocturnal pain in the hand, or any other disorders of the shoulders, arms, wrists, or fingers is advised to consult a physician. If it is determined that the symptoms are job related or aggravated by movements and postures dictated by the job design, it may be necessary for the employer to take steps to prevent further occurrences. These steps might include, but are not limited to, repositioning the workpiece or redesigning the workstation, reassigning workers to other jobs, rotating jobs, changing work pace, and/or changing the type of tool used so as to minimize stress on the operator. Some tasks may require immize stress on the operator. Some tasks may require immize relationship. relationship.

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The following suggestions will help reduce or moderate the effects of repetitive workmotions and/or extended vibration exposure:

• Use a minimum hand grip force consistent with proper

- use a minimum nand grip force consistent win proper control and safe operations.
 Neep body and hands warm and dry (cold weather is reported to be a major factor contributing to Raynaud's Syndrome).
 Avoid anything that inhibits blood circulation
 Smoking Tobacco (another contributing factor)
 Cold Temperatures

- Certain Drugs Tasks should be performed in such a manner that the
- Tasks should be performed in such a manner that the
 wrists are maintained in a neutral position, which is not
 flexed, hyperextended, or turned side to side
 Stressful postures should be avoided select a tool
 appropriate for the job and work location
 Avoid highly repetitive movements of hands and wrists,
 and continuous vibration exposure (aftreach period of
 operation, exercise to increase blood circulation)
 Interrupt work, activities, or rotate jobs to provide periods
 free from repetitive work motions
 Keeo tool yell maintained and replace worn parts
- Keep tool well maintained and replace worn parts



Speed and Feed Selection Considerations

Because our Advanced Drilling Equipment tools are portable and generally hand-carried from one drill location to the next, every effort has been made to make them as compact and light-weight as possible without compromising the strength required to provide rugged durability and service. A wide selection of feeds and speeds are available to accommodate drilling of a variety of materials.

▲ CAUTION Good machining practice is an integral part tool and the cutter. Selection of speeds and feeds must take into consideration workpiece material and hardness, cutter geometry and sharpness, and quality of lubrication.

Use of the highest feed rates at the lowest speeds in conjunction with very tough or hard materials will likely result in junction with very tough or hard materials will likely result in higher than normal maintenance. The exceptionally low speeds, obtained by high numerical gear reductions, can yield very high theoretical stall torque that far exceed the torque requirements of a well engineered drilling application. High loads imposed by feeds excessive for the material and cutter combination may result in damage.

Conversion Table

Torque - Air Pressure - Miscellaneous

TORQUE CONVERSION - IN. LBS. (NM)									
In.	Nm	In.	Nm	In.	Nm				
5	0.6	50	5.7	140	15.8				
10	1.1	60	6.8	150	17.0				
15	1.7	70	7.9	160	18.1				
20	2.3	80	9.0	170	19.2				
25	2.8	90	10.2	180	20.3				
30	3.4	100	11.3	190	21.5				
35	4.0	110	12.4	200	22.6				
40	4.5	120	13.6						
45	5.1	130	14.7						

Suggested Surface Speeds for High Speed Steel Drills*	
MATERIAL	S.F.M.
Alloy Steels - 300 to 4000 Brinell	20-30
Stainless Steels - Medium range	30-40
Automotive Steel Forgings and the like	40-50
Tool Steels Annealed - 90 to 1.20 Carbon	50-60
Steels40 to .50 Carbon	70-80
Steels20 to .30 Carbon (Machinery Steel)	80-110
Hard, Chilled Cast Iron	30-40
Medium Hard Cast Iron	70-110
Soft Cast Iron	100-150
Malleable Iron	80-90
Monel Metal	40-50
High Tensile Strength Bronze	70-150
Ordinary Brass and Bronze	200-300
Aluminum and its Common Alloys	250-400
Magnesium and its Common Alloys	250-400
Plastics - Common Types	100-150
Wood	300-400

arbon Steel Drills should be operated at 40%-50% of the ove speeds.

above speeds.

These speeds indicate the approximate range under normal conditions. For peak performance on individual jobs, adjustments may be required. To convert surface feet per minute (SFM) into revolutions per minutes (RPM) use the following formula:

RPM = SFM x 3.82 Diameter

Example: To drill 1/4" hole in aluminum: $\frac{300 \times 3.82}{250}$ = 4.584 RPM

Recommended Tool: Cleco 111 DO-50B

TORQUE CONVERSION FACTORS						
To Convert	Into	Mulitply By				
Inch Pounds	Foot Pounds	0.0835				
Inch Pounds	Newton meters	0.1130				
Inch Pounds	Kg-meters	0.0115				
Inch Pounds	Kg-Cm	1.1519				
Foot Pounds	Inch Pounds	12.000				
Foot Pounds	Newton meters	1.3560				
Foot Pounds	Kg-meters	0.1382				
Foot Pounds	Kg-Cm	13.8240				
Newton Meters	Inch Pounds	8.8440				
Newton Meters	Foot Pounds	0.7370				
Newton Meters	Kg-meters	0.1020				
Newton Meters	Kg-Cm	10.2000				
Kg meters	Inch Pounds	86.8100				
Kg meters	Foot Pounds	7.2340				
Kg meters	Newton-meters	9.8040				
Kg Cm	Inch Pounds	0.8681				
Kg Cm	Foot Pounds	0.0723				
Kg Cm	Newton-meters	0.0980				

MISCELLANEOUS CONVERSION FACTORS						
Mulitply By	Into	To Convert				
25.4000	Millimeters	Inches				
0.0394	Inches	Millimeters				
0.4536	Kilograms	Pounds				
2.2050	Pounds	Kilograms				
0.069	bar	psi				
14.5	psi	bar				

AIR PRESSURE CONVERSION							
PSI	kPa*	Bar**					
85	586	5.9					
90	620	6.2					
95	655	6.6					
100	690	6.9					
125	860	8.6					

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* Preferred: Approximate to the nearest 5 kPa.
** Approximate to the nearest 0.5 Bar.

Drill Diameter	Surface Speed, Feet per Minute											
(inches)	30	40	50	60	70	80	90	100	110	200	300	400
Spindle Speeds, RPM												
1/4	458	611	764	917	1070	1222	1375	1528	1681	3056	4584	6111
5/16	367	489	611	733	856	976	1100	1222	1345	2445	3666	4888
3/8	306	407	509	611	713	815	917	1019	1120	2037	3056	4074
7/16	262	349	437	524	611	698	786	873	960	1746	2619	3492
1/2	229	306	382	458	535	611	688	764	840	1528	2282	3056

If there is a choice between tools of about the same speed but of different sizes, final se power to maintain speed under load.



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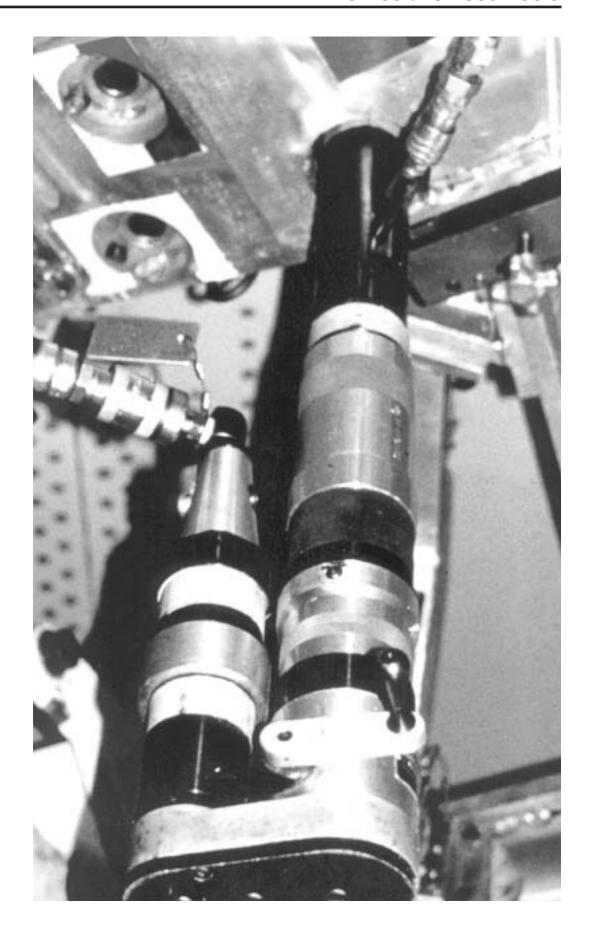
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Cooper (China) Co., Ltd. 18th Floor Yu An Building

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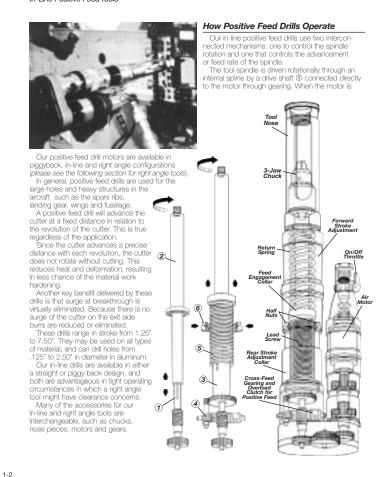
China

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Introduction

In-Line Positive Feed Tools



turned on, the spindle will rotate at a speed determined by the motor and gearing. The spindle ② rotates with the drive shaft, yet is free to slide or

telescope axially.

Surrounding part of the spindle is the lead screw. driver @ that has a gear affixed to one end. The gear on the lead screw driver is connected to the motor gearing by a worm and cross shaft arrangement @ and turns the lead screw driver at a fixed ratio with respect to the spindle. The lead screw driver rotates when the motor is turned on, but cannot move axially.

The lead screw
telescopes over the lead screw

driver. The lead screw we rescupe a vortile that as different and the state of the lead screw driver so that it rotates with it while being free to slide axially. The lead screw will rotate any time the motor is turned on, but not

move axially until the feed is engaged.

The positive feed is accomplished by engaging a pair of half nuts (a) (threaded nuts which have been sectioned) with the lead screw by rotating the feed engagement collar. The half nuts are held stationary by the housing. With the lead screw rotating and the half nuts engaged, the lead screw

will advance and push the spindle forward.

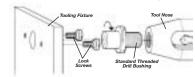
Since both the feed mechanism and spindle rotation mechanism are driven from one source, a fixed rate of spindle advancement is achieved for

each rotation of the spindle.

When the spindle has advanced to the predetermined depth, the retract stop is tripped, shifting the feed collar. This action releases the half nuts, and the spindle and lead screw are returned to the starting position ready for the next drilling cycle.

Taper-Lok Fixturing

Customized fixtures are constructed to accept Taper-Lok Bushing Tips. Advanced Drilling Equipment tools with the Bushing Tips are inserted into the fixture, twisted and cam-locked into place.

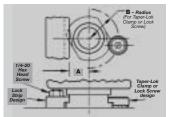


The Bushing Tip's tapered flanges fit under the shoulder of lock screws in the fixture. The Bushing Tip holds the tool in alignment and absorbs the thrust and torque of drilling, At the completion of the drilling cycle, the tools is rotated to unlock, withdrawn from the fixture and moved to the next position.

Several different types of Taper-Lok Fixturing are available. The following are the most common.







Location Data for Taper-Lok Clamp, Lock Screw, and Lock Strip Mounting

Drill Bushing Tip Series	Α	В	Tool Nose Thread (I.D.)
21000	.312	.625	3/4-16
22000	.609	.922	1-14
23000	.734	1.047	1 1/4-12
24000	.859	1.172	1 1/2-12
25000	None	1.562	2-16

QUACKENBUSH

15QD-S125 Series

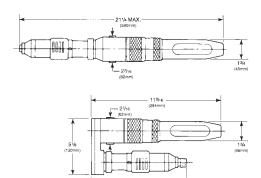
Capacity: Aluminum – .375" (9.5mm) Titanium – .3125" (7.9mm) Steel – .3125" (7.9mm)

- 15 series motor develops 1.0 nominal horsepower.
- Positive mechanical feed provides fixed rate of feed with respect to spindle rotation.
- Drill spindle returns to starting position by manually rotating feed engagement collar.
- Starting position of drill may be adjusted by rotating rear stroke adjustment collar.
- Spindle feed is activated by manually rotating feed engagement collar.
- Overload clutch protects feed mechanism.

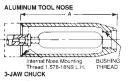


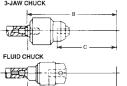
Model	Motor	Maximu	m Stroke Weight Spindle		Feed Per	Chuck	Inlet	Minimum		
model	Configuration	in.	mm	lbs	kg	Speeds	Revolution	on Capacity		Hose Size
15QD-S125	Straight	1.25	32	7	3.18	160, 250, 400, 800, 1400, 2000, 3000	.0005, .001, .002, .003, .004, .006, .008	.3125"	.375" NP1	.375"
15QDB-S125	Piggy Back	1.25	32	7	3.18	160, 250, 400,800, 1400, 2000, 3000	.0005, .001, .002, .003, .004, .006, .008	.3125"	.375" NP1	.375"

STANDARD EQUIPMENT: 3 Jaw Chuck 849108 and Key 849120. NOTE:
Specify TOOL NOSE when ordering, Standard Noses page 1-5.
Rated tool performance at 90 PSIG measured at tool inlet with motor running.
When selecting speeds and feeds, see page 1-5.
SEE PAGES I-11-H-13 FOR SAFETY PRECAUTIONS.



-11 MAX. (280mm)







Bushing Thread	Length A	Part Number
.75-16LH	.3125 (132mm)	619143
1 -14LH	5.4375 (138mm)	619142
1.25-12LH	5.4375 (138mm)	619271

Bushing Thread	Dimension B	Dimension C	Desc.	Part Number
.75-16LH	4.625 (118mm)	3.3125 (84mm)	.375" Chuck	849108
1 -14LH	4.875 (124mm)	3.5625 (90mm)	Key	849120
1.25-12LH	4.875 (124mm)	3.5625 (90mm)		

Bushing Thread	Dim. D Side Feed	Dim. D End Feed	Part Number*					
.75-16LH	4.0938 (104mm)	3.3125 (84mm)						
1 -14LH	4.3438 (111mm)	3.5625 (90mm)						
1.25-12LH	4.3438 (111mm)	3.5625 (90mm)						
*See page 1-37 for Selection and Part Number								

Bushing Thread	Dim. E - No. 1 MT 613542	Dim. E - No. 2 MT 612934
.75-16LH	4.0625 (103mm)	4.2188 (107mm)
1 -14LH	4.1563 (110mm)	4.4688 (114mm)
1.25-12LH	4.1563 (110mm)	4.4688 (114mm)

1-5 1-4

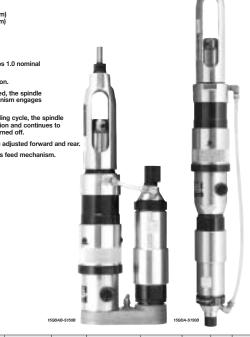
15QDA-S150B Semi-Automatic Series

Capacity: Aluminum – .375" (9.5mm) Titanium – .3125" (7.9mm) Steel – .3125" (7.9mm)

Stroke: Max - 1.5" (38mm) Min. - .5625" (14mm)

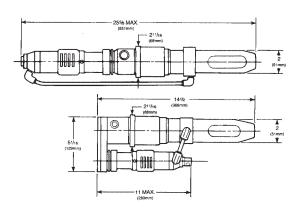
In-Line Tools

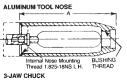
- 15 series motor develops 1.0 nominal horsepower.
- Semi-automatic operation.
- When throttle is activated, the spindle rotates and feed mechanism engages automatically
- Upon completion of drilling cycle, the spindle returns to starting position and continues to rotate until throttle is turned off.
- Length of stroke can be adjusted forward and rear.
- Overload clutch protects feed mechanism.



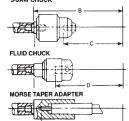
Model	Motor Maximum Stroke Weight		Spindle	Feed Per	Chuck	Inlet	Minimum			
model	Configuration	in.	mm	lbs	kg	Speeds	Revolution	Capacity		Hose Size
15QDA-S150B	Straight	1.5"	38	10	4.53	160, 250, 400, 800, 1400, 2000, 3000	.0005, .001, .002, .003, .004, .006, .008	.375"	.375" NP1	.375"
15QDAB-S150B	Piggy Back	1.5"	38	10	4.53	160, 250, 400, 800, 1400, 2000, 3000	.0005, .001, .002, .003, .004, .006, .008	.375"	.375" NP1	.375"

STANDARD EQUIPMENT: 3 Jaw Chuck 614929 and Key 849123; Forward Stroke Adjustment Wrench 614190. NOTE:
Specify TOOL NOSE when ordering, Standard Noses page 1-7.
Rated foot performance at 90 PSIG measured at tool inlet with motor running.
When selecting speeds and feeds, see page 1-5.
SEE PAGES I-11-I-13 FOR SAFETY PRECAUTIONS.





Bushing Thread	Length A	Part Number
.75 - 16LH	5.1875 (132mm)	619662
1 -14LH	5.4375 (138mm)	619683
1.25 -12LH	5.4375 (138mm)	619704



Bushing Thread	Dim. D Side Feed	Dim. D End Feed	Part Number*
.75 - 16LH	4.5 (114mm)	3.6875 (94mm)	
1 -14LH	4.7188 (120mm)	3.9375 (100mm)	
1.25 -12LH	4.7188 (120mm)	3.9375 (100mm)	
*See page 1-37 for Se	election and Part Number		

Bushing Thread	Dim. E - No. 1 MT 613542	Dim. E - No. 2 MT 612934		
.75 - 16LH	4.4688 (113mm)	4.5938 (117mm)		
1 -14LH	4.7188 (119mm)	4.8438 (123mm)		
1 25 121 1	4 7100 (110mm)	4 9439 (433mm)		

1-7 1-6

In-Line Tools

QUACKENBUSH

158QGDA-S150B Semi-Automatic Series

Capacity: Aluminum – .375" (9.5mm) Titanium – .3125" (7.9mm) Steel – .3125" (7.9mm)

1-8

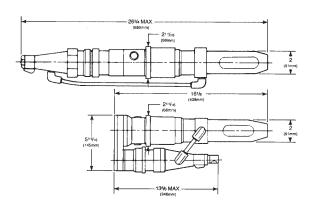
Stroke: Max - 1.5" (38mm) Min. - .5625" (14mm)

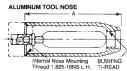
- 158 series motor develops 1.6 nominal horsepower.
 Available in straight and piggy-back models with fixed and variable speed motors.
- Semi-automatic operation.
- When throttle is activated, the spindle rotates and feed mechanism engages automatically.
- Upon completion of drilling cycle, the spindle returns to starting position and continues to rotate until throttle is turned off.
- Length of stroke can be adjusted forward and rear.
- Overload clutch protects feed mechanism.



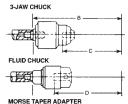
Model	Motor	Maximu	m Stroke	We	ight	Spindle	Feed Per	Chuck	Inlet	Minimum
Wodel	Configuration	in.	mm	lbs	kg	Speeds	Revolution	Capacity	illet	Hose Size
158QGDA-S150B	Straight	1.5"	38	12	5.44	95, 135, 165, 190 215, 245, 265, 350, 380, 420, 445, 525, 700, 750, 850, 900 1100, 1450, 1500, 1745 1800, 2175, 2900, 3600		.375"	.375" NPT	.375"
158QGDAV-S150B VARIABLE SPEED	Straight	1.5"	38	12	5.44	95/245, 175, 445 350/850, 750/1800 1450/3600	.0005, .001, .002, .003, .004, .006, .008	.375"	.375" NPT	.375"
158QGDAB-S150B	Piggy Back	1.5"	38	12	5.44	55, 80, 95, 110, 125, 135, 150, 185, 250, 265, 310, 320, 400, 450, 535, 540, 640, 660, 900, 1100, 1460 1740, 2100, 2870, 3440	.0005, .001, .002, .003, .004, .006, .008	.375"	.375" NPT	.375"
158QGDABV-S150B VARIABLE SPEED	Piggy Back	1.5"	38	12	5.44	125/310, 265/640 450/1100, 1460/3440	.0005, .001, .002, .003, .004, .006,	.375"	.375" NPT	.375"
STANDARD EQUIPMENT						NOTE:	,,			

NOTE:
Specify TOOL NOSE when ordering. Standard Noses page 1-9.
Rated tool performance at 90 PSIG measured at tool inlet with motor running.
When selecting specia and feeds, see page 1-5.
SEE PAGES 1-11-1-13 FOR SAFETY PRECAUTIONS. 3 Jaw Chuck 614929 and Key 849123. Forward Stroke Adjustment Wrench 614190.





Bushing Thread	Length A	Part Number
.75 - 16LH	5.625 (143mm)	619662
1 -14LH	5.875 (149mm)	619683
1.25 -12LH	5.875 (149mm)	619704



1 -14LH 1.25 -12LH		3.7813 (96mm) 3.7813 (96mm)	Key	849123
Bushing Thread	Dim. D Side Feed	Dim. D End Fee	i	Part Number*
.75 - 16LH	4.5 (114mm)	3.6875 (94mm)		
1 -14LH	4.7188 (120mm)	3.9375 (100mm))	
1.25 -12I H	4.7188 (120mm)	3.9375 (100mm))	

1-9

| Bushing Thread | Dimension B | Dimension C | Desc. | Part Number | .75 - 16LH | 5 (127mm) | 3.5625 (90mm) | .375 Chuck | 614929 |

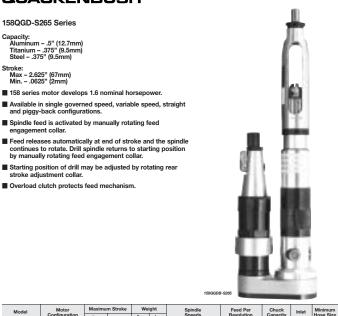
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1 -14LH	4.7188 (120mm)	3.9375 (100mm)							
1.25 -12LH	4.7188 (120mm)	3.9375 (100mm)							
*See page 1-37 for Selection and Part Number									
Bushing Thread	Dim. E - No. 1 MT 613542	Dim. E - No. 2 MT 612934							
.75 - 16LH	4.4688 (113mm)	4.5938 (117mm)							
	4,7188 (119mm)	4.8438 (123mm)							
1 -14LH	4.7 (88 (119mm)	4.0430 (123MM)							
	613542	612934							

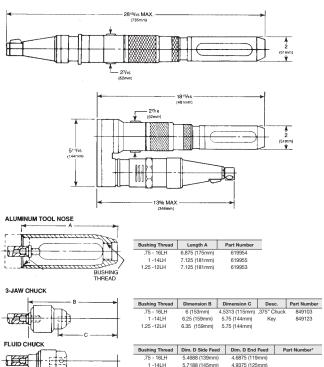
158QGD-S265 Series

Capacity: Aluminum – .5" (12.7mm) Titanium – .375" (9.5mm) Steel – .375" (9.5mm)

- 158 series motor develops 1.6 nominal horsepower.
- Available in single governed speed, variable speed, straight and piggy-back configurations.
- Spindle feed is activated by manually rotating feed engagement collar.
- Feed releases automatically at end of stroke and the spindle continues to rotate. Drill spindle returns to starting position by manually rotating feed engagement collar.
- Starting position of drill may be adjusted by rotating rear stroke adjustment collar.
- Overload clutch protects feed mechanism.



	Configuration	in.	mm	lbs	kg	Speeds	Revolution	Capacity		Hose Size
158QGD-S265	Straight	2.625"	67	12.5	5.67	175, 215, 265, 350, 380, 420, 445, 525, 700, 750, 850, 900, 1100, 1450, 1500, 1745 1800, 2175, 2900, 3600		.375"	.375" NPT	.5"
15QGDB-S265	Piggy Back	2.625"	67	12.5	5.67	125, 150, 185, 250, 265, 320, 400, 450, 535, 540, 640, 660, 900, 1100, 1460, 1740, 2100, 2870, 3440	.0005, .001, .002, .003, .004, .006, .008	375"	.375" NPT	.5"
158QGDV-S265 Variable Speed	Straight	2.625"	67	12.5	5.67	175/445, 350/850, 750/1800, 1450/3600	.0005, .001, .002, .003, .004, .006, .008	375"	.375" NPT	.5"
158QGDBV-S265 Variable Speed	Piggy Back	2.625"	67	12.5	5.67	125/310, 265/640 450/1100, 1460/3440	.0005, .001, .002, .003, .004, .006,	375"	.375" NPT	.5"
STANDARD EQUIPME 3 Jaw Chuck 84910						NOTE: Specify TOOL NOSE wh Rated tool performance When selecting speeds SEE PAGES I-11-I-13 FG	at 90 PSIG measure and feeds, see page	d at tool inlet I-5.		running.



	1 -14LH 1.25 -12LH *See page 1-37 for Se	5.7188 (145mm) 5.7188 (145mm) election and Part Numbe	4.9375 (125mm) 4.9375 (125mm)
MORSE TAPER ADAPTER			
	Bushing Thread	Dim. E - No. 1 MT 613542	Dim. E - No. 2 MT 612934
(AZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZ	.75 - 16LH	5.4688 15/2 (138mm)	5.625 (142mm)
E	1 -14LH	5.7188 21/2 (145mm)	5.8438 (148mm)
	1.25 -12LH	5.7188 21/2 (145mm)	5.8438 (148mm)

1-10 1-11

15QDA-S275B Semi-Automatic Series

Capacity: Aluminum – .375" (9.5mm) Titanium – .3125" (7.9mm) Steel – .3125" (7.9mm)

Stroke: Max - 2.75" (70mm) Min. - .625" (16mm)

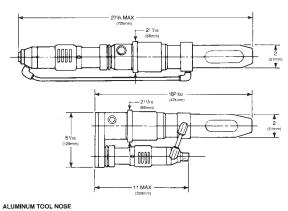
In-Line Tools

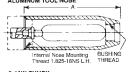
- 15 series motor develops 1.0 nominal horsepower.
- Semi-automatic operation.
- When throttle is activated, the spindle rotates and feed mechanism engages automatically
- Upon completion of drilling cycle, the spindle returns to starting position and continues to rotate until throttle is turned off.
- Length of stroke can be adjusted forward and rear.
- Overload clutch protects feed mechanism.



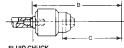
Model	Motor	Maximu	m Stroke	We	ight	Spindle	Feed Per	Chuck		Minimum
	Configuration	in.	mm	lbs	kg	Speeds	Revolution	Capacity		Hose Size
15QDA-S275B	Straight	2.75"	70	10	4.53	160, 250, 400, 800, 1400, 2000, 3000	.0005, .001, .002, .003, .004, .006, .008	.375"	.375" NP1	Г .375"
15QDAB-S275B	Piggy Back	2.75"	70	10.5	4.76	160, 250, 400, 800, 1400, 2000, 3000	.0005, .001, .002, .003, .004, .006,	.375"	.375" NP1	Г .375"

STANDARD EQUIPMENT: 3 Jaw Chuck 614929 and Key 849123; Forward Stroke Adjustment Wrench 614190. NOTE:
Specify TOOL NOSE when ordering. Standard Noses page 1-13.
Rated tool performance at 90 PSIG measured at tool inlet with motor running.
When selecting speeds and feeds, see page 1-5.
SEE PAGES 1-11-1-13 FOR SAFETY PRECAUTIONS.



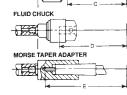


Bushing Thread	Length A	Part Number
.75 - 16LH	6.875 (175mm)	619954
1 -14LH	7.125 (181mm)	619955
1.25 - 12LH	7.125 (181mm)	619953



3-JAW CHUCK





Bushing Thread	Dim. D Side Feed	Dim. D End Feed	Part Number*
.75 - 16LH	5.4688 (139mm)	4.6875 (119mm)	
1 -14LH	5.7188 (145mm)	4.9375 (125mm)	
1.25 - 12LH	5.7188 (145mm)	4.9375 (125mm)	
*See page 1-37 for Se			
	Dim. E No. 1 MT	Dim. E No. 2 MT	

Bushing Thread	Dim. E No. 1 MT 613542	Dim. E No. 2 MT 612934		
.75 - 16LH	5.4688 (138mm)	5.625 (142mm)		
1 -14LH	5.7188 (145mm)	5.8438 (148mm)		
1.05 10111	E 7100 (14Emm)	E 0420 (440mm)		

1-12 1-13

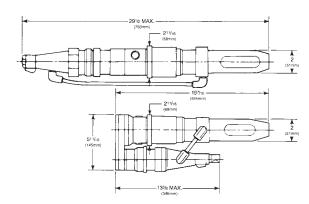
158QGDA-S275B Semi-Automatic Series Capacity: Aluminum - .375" (9.5mm) Titanium - .3125" (7.9mm) Steel - .3125" (7.9mm) Stroke: Max - 2.75" (70mm) Min. - .625" (16mm) 158 series motor develops 1.6 nominal horsepower. Available in straight and piggy-back models with fixed and variable speed motors. Semi-automatic operation. When throttle is activated, the spindle rotates and feed mechanism engages automatically. Upon completion of drilling cycle, the spindle returns to starting position and continues to rotate until throttle is turned off. Length of stroke can be adjusted forward and rear. Overload clutch protects feed mechanism.

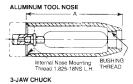
In-Line Tools

1-14

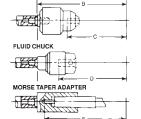
QUACKENBUSH

	Model	Motor	Maximu	m Stroke	roke Weight		Spindle	Feed Per	Chuck	Inlet	Minimum
	Model	Configuration	in.	mm	lbs	kg	Speeds	Revolution	Capacity	mict	Hose Size
	158QGDA-S275B	Straight	2 .75"	70	13	5.89	95, 135, 165, 175, 190, 215, 245, 265, 350, 380, 420, 445, 525, 700, 750, 850, 900 1100, 1450, 1500, 1745 1800, 2175, 2900, 3600	,	.375"	.375" NP1	.375"
	158QGAV-S275B Variable Speed	Straight	2 .75"	70	13	5.89	95/245, 75, 445, 350/850, 750/1800, 1450/3600	.0005, .001, .002, .003, .004, .006, .008	.375"	.375" NP1	.375"
	158QGDAB-S275B	Piggy Back	2 .75"	70	15	6.8	125, 150, 185, 250, 265, 310, 320, 400, 450, 535, 540, 640, 660, 900, 1100, 1460, 1740, 2100, 2870, 3440	.0005, .001, .002, .003, .004, .006, .008	.375"	.375" NP1	.375"
	158QGDABV-S275B Variable Speed	Piggy Back	2 .75"	70	15	6.8	125/310, 265/640 450/1100, 1460/3440	.0005, .001, .002, .003, .004, .006,	.375"	.375" NP1	.375"
Rated to When se							NOTE: Specify TOOL NOSE wh Rated tool performance When selecting speeds SEE PAGES I-11-I-13 Fo	at 90 PSIG measure and feeds, see page	d at tool inlet I-5.	e 1-15. with motor	running.





Bushing Thread	Length A	Part Number
.75 - 16LH	6.875 (175mm)	619954
1 -14LH	7.125 (181mm)	619955
1.25 - 12LH	7.125 (181mm)	619953



Bushing Thread	Dimension B	Dimension C	Desc.	Part Number
.75 - 16LH	6 (152mm)	4.5313 (115mm)	.375" Chuck	614929
1 -14LH	6.25 (159mm)	5.625 (144mm)	Key	849123
1.25 - 12LH	6.25 (159mm)	5.625 (144mm)		

Bushing Thread	Dim. D Side Feed	Dim. D End Feed	Part Number*
.75 - 16LH	5.4688 (139mm)	4.6875 (119mm)	
1 -14LH	5.7188 (145mm)	4.9375 (125mm)	
1.25 - 12LH	5.7188 (145mm)	4.9375 (125mm)	
*See page 1-37 for Se	election and Part Numbe	r	

Bushing Thread	Dim. E No. 1 MT 613542	Dim. E No. 2 MT 612934		
.75 - 16LH	5.4688 (138mm)	5.625 (142mm)		
1 -14LH	5.7188 (145mm)	5.8438 (148mm)		
1.25 - 12LH	5.7188 (145mm)	5.8438 (148mm)		

158QGDB-S400 Series

Capacity: Aluminum – 1.25" (32mm) Titanium – 1" (25.4mm) Steel – 1" (25.4mm)

1-16

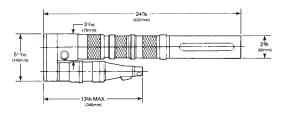
Stroke: Max - 4" (101mm) Min. - 1 .75" (44mm)

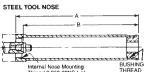
- 158 series motor develops 1.6 nominal horsep
- Piggy-back motor mount reduces overhang.
- Length of stroke can be adjusted by rotating both the forward and rear stroke adjustment collars.
- Drill feed is activated by rotating feed engagement collar.
- Spindle may be returned to starting position at any time during feed cycle.
- \blacksquare At end of stroke, spindle automatically returns to starting position.
- Available in single governed speeds and variable speed ranges.
- Overload clutch protects feed mechanism.



Model	Motor Configuration	Maximum Stroke		Weight		Spindle	Feed Per	Chuck	Inlet	Minimum
		in.	mm	lbs	kg	Speeds	Revolution	Capacity		Hose Size
158QGDB-S400	Piggy Back	4"	102	18.5	8.39	55, 80, 95, 110, 125, 135, 150, 185, 250, 310, 400, 535, 660, 900, 1100, 2100, 2870, 3440	.0005, .001, .002, .003, .004, .006, .008, .012, 016	.5"	.375" NPT	.5"
158QGDBV-S400 Variable Speed	Piggy Back	4"	102	18.5	8.39	55-135, 125-310, 265-640, 450-1100, 450-1100, 1460-3440	.0005, .001, .002, .003, .004, .006, .008, .012, 016	.5"	.375" NPT	.5"

	400 1100, 1400 0440 1.000, 1012, 010
STANDARD EQUIPMENT:	NOTE:
3 Jaw Chuck 849415 and Key 849121.	Specify TOOL NOSE when ordering. Standard Noses page 1-17. Rated tool performance at 90 PSIG measured at tool inlet with motor running. When selecting speeds and feeds, see page I-5. SEE PAGES I-11-13 FOR SAFETY PRECAUTIONS.

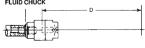








3-JAW CHUCK





Bushing Thread	Length A	Length B	Part Number	
.75 - 16LH	9.5 (241mm)	8.75 (227mm)	621235	
1 - 14LH	1 - 14LH 9.5 (241mm) 8.75 (227mm)			
1.25 - 12LH	9.5 (241mm)	8.75 (227mm)	621237	
1.5 - 12LH	9.5 (241mm)	8.75 (227mm)	621238	
2 - 16LH	9.375 (238mm)	8.625 (223mm)	614751	

Bushing Thread	Dimension C	C Desc. Part Number			
.75 - 16LH	7.2813 (185mm)	.5" Chuck	8494	15	
1 - 14LH	7.2813 (185mm)	Key	21		
1.25 - 12LH	7.2813 (185mm)				
1.5 - 12LH	7.2813 (185mm)				
2 - 16LH	7.2188 (182mm)				
Bushing Thread	Dim. D Side Feed	Dim. D E	nd Feed	Part Number	
Bushing Thread .75 - 16LH	7.75 (199mm)	7.4375 (1		Part Number	
			89mm)	Part Number	
.75 - 16LH	7.75 (199mm)	7.4375 (1	89mm) 89mm)	Part Number	
.75 - 16LH 1 - 14LH	7.75 (199mm) 7.75 (199mm)	7.4375 (1 7.4375 (1	89mm) 89mm) 89mm)	Part Number	

Bushing Thread	Dim. E No. 1 MT 619533	Dim. E No. 2 MT 619405	Dim. E No. 3 MT 619406	Dim. E No. 4 MT 623931
.75 - 16LH	8.0625 (205mm)	8.0625 (205mm)	8.1875 (208mm)	7.9375 (202mm)
1 - 14LH	8.0625 (205mm)	8.0625 (205mm)	8.1875 (208mm)	7.9375 (202mm)
1.25 - 12LH	8.0625 (205mm)	8.0625 (205mm)	8.1875 (208mm)	7.9375 (202mm)
1.5 - 12LH	8.0625 (205mm)	8.0625 (205mm)	8.1875 (208mm)	7.9375 (202mm)
2 - 16LH	8.9375 (227mm)	8.9375 (227mm)	8.0625 (205mm)	7.75 (198mm)

158QGDB-RF-S400 Back Spotfacer Series

Stroke: Max - 4" (101mm) Min. - 1.75" (44mm)

1-18

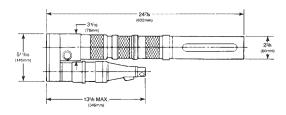
In-Line Tools

- 158 series motor develops 1.6 nominal horsepower.
- Piggy-back motor mount reduces overhang.
- Length of stroke can be adjusted by rotating both the forward and rear stroke adjustment collars.
- Reverse feed is activated by rotating feed engagement collar.
- Spindle may be returned to starting position at any time during feed cycle by manually rotating feed engagement collar
- At end of stroke, spindle automatically returns to starting position.
- Available in single governed speeds and variable speed ranges.
- Overload clutch protects feed mechanism.



Model	Motor	Maximu	m Stroke	We	Veight Spindle		Feed Per	Chuck	Inlet	Minimum
Model	Configuration	in.	mm	lbs	kg	Speeds	Revolution	Capacity	mict	Hose Size
158QGDB-RF-S400	Piggy Back	4"	102	18.5	8.39	55, 80, 95, 110, 125, 135, 150, 185, 250, 310, 400, 535, 660, 900, 1100, 2100, 2870, 3440	.0005, .001, .002, .003, .004, .006, .008, .012, 016	.5"	.375" NPT	.5"
158QGDBV-RF-S400 Variable Speed	Piggy Back	4"	102	18.5	8.39	55-135, 125-310, 265-640, 450-1100, 450-1100, 1460-3440	.0005, .001, .002, .003, .004, .006, .008, .012, 016	.5"	.375" NPT	.5"

STANDARD EQUIPMENT: 3 Jaw Chuck 849415 and Key 849121. NOTE:
Specify TOOL NOSE when ordering. Standard Noses page 1-19.
Rated tool performance at 90 PSIG measured at tool inlet with motor running.
When selecting speeds and feeds, see page 1-5.
SEE PAGES 1-11-1-13 FOR SAFETY PRECAUTIONS.



STEEL TOOL NOSE				
A				
B	Bushing Thread	Length A	Length B	Part Number
	.75 - 16LH	9.5 (241mm)	8.75 (227mm)	621235
27.4	1 - 14LH	9.5 (241mm)	8.75 (227mm)	621236
# 	1.25 - 12LH	9.5 (241mm)	8.75 (227mm)	621237
	1.5 - 12LH	9.5 (241mm)	8.75 (227mm)	621238
Internal Nose Mounting BUSHING Thread 2.250-20NS L.H. THREAD	2 - 16LH	9.375 (238mm)	8.625 (223mm)	614751

3-JAW CHUCK				
3-JAW CHUCK	Bushing Thread	Dimension C	Desc.	Part Number
	.75 - 16LH	3.2813 (83mm)	.5" Chuck	849415
CESSON III	1 - 14LH	3.2813 (83mm)	Key	849121
1635-1117	1.25 - 12LH	3.2813 (83mm)		
	1.5 - 12LH	3.2813 (83mm)		
	2 - 16LH	3.3438 (85mm)		

400QGDBV-S400 Series

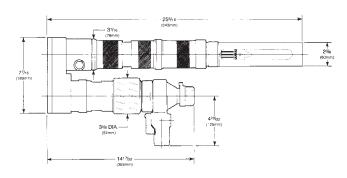
Capacity: Aluminum – 1.25" (32mm) Titanium – 1" (25.4mm) Steel – 1" (25.4mm)

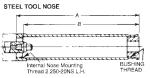
- 400 series motor develops 4.0 nominal horsepower.
- Dial selectable speeds include tamper-resistant speed adjustment lock.
- Drill feed is activated by rotating feed engagement collar.
- Spindle may be returned to starting position at any time during feed cycle.
- Spindle automatically returns to starting position at end of feed stroke.
- Length of stroke can be adjusted by rotating both the forward and rear stroke adjustment collars.
- Swivel air inlet permits easy air hose repositioning.
- Motor has quick response variable speed governor.
- Overload clutch protects feed mechanism.



Model	Motor	Maximu	m Stroke	Wei	ight	Spindle	Feed Per	Chuck	Inlet	Minimum
	Configuration	in.	mm	lbs	kg	Speeds	Revolution	Capacity		Hose Size
400QGDBV-S400	Piggy Back	4"	102	32.5	14.8	55/125, 135/310 325/750,	.0005, .001, .002, .003, .004, .006,	.5"	.5" NPT	.75"

STANDARD EQUIPMENT: 3 Jaw Chuck 849415 and Key 849121. NOTE:
Specify TOOL NOSE when ordering, Standard Noses page 1-21.
Rated tool performance at 90 PSIG measured at tool inlet with motor running.
When selecting speeds and feeds, see page 1-5.
SEE PAGES 1-11-1-13 FOR SAFETY PRECAUTIONS.

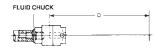




Bushing Thread	Length A	Length B	Part Number
.75 - 16LH	9.5 (241mm)	8.75 (227mm)	621235
1 - 14LH	9.5 (241mm)	8.75 (227mm)	621236
1.25 - 12LH	9.5 (241mm)	8.75 (227mm)	621237
1.5 - 12LH	9.5 (241mm)	8.75 (227mm)	621238
2 - 16LH	9.375 (238mm)	8.625 (223mm)	614751

3-JAW CHUCK		
	с	

.75 - 16LH 1 - 14LH	7.2813 (185mm) 7.2813 (185mm)	.5" Chuck Key	849415 849121
	7.2813 (185mm)	Key	849121
1.25 - 12LH	7.2813 (185mm)		
1.5 - 12LH	7.2813 (185mm)		
2 - 16LH	7.2188 (182mm)		



Bushing Thread	Dim. D Side Feed	Dim. D End Feed	Part Number*
.75 - 16LH	7.75 (199mm)	7.4375 (189mm)	
1 - 14LH	7.75 (199mm)	7.4375 (189mm)	
1.25 - 12LH	7.75 (199mm)	7.4375 (189mm)	
1.5 - 12LH	7.75 (199mm)	7.4375 (189mm)	
2 - 16LH	7.75 (199mm)	7.3125 (185mm)	
*See page 1-37 for Se	election and Part Numbe	r	



Bushing Thread	Dim. E No. 1 MT 619533	Dim. E No. 2 MT 619405	Dim. E No. 3 MT 619406	Dim. E No. 4 MT 623931
.75 - 16LH	8.0625 (205mm)	8.0625 (205mm)	8.1875 (208mm)	7.9375 (202mm)
1 - 14LH	8.0625 (205mm)	8.0625 (205mm)	8.1875 (208mm)	7.9375 (202mm)
1.25 - 12LH	8.0625 (205mm)	8.0625 (205mm)	8.1875 (208mm)	7.9375 (202mm)
1.5 - 12LH	8.0625 (205mm)	8.0625 (205mm)	8.1875 (208mm)	7.9375 (202mm)
2 - 16LH	8.9375 (227mm)	8.9375 (227mm)	8.0625 (205mm)	7.75 (198mm)

1-21 1-20

400QGDBV-RF-S400 Back Spotfacer Series

1-22

Stroke: Max - 4" (101mm) Min. - 1.75" (44mm)

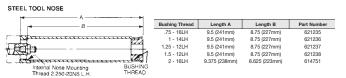
- 400 series motor develops 4.0 nominal horsepower.
- Dial selectable speeds include tamper-resistant speed adjustment lock.
- Reverse feed is activated by rotating feed engagement collar.
- Spindle may be returned to starting position at any time during feed cycle.
- Spindle automatically returns to starting position at end of feed stroke.
- Length of stroke can be adjusted by rotating both the forward and rear stroke adjustment collars.
- Swivel air inlet permits easy air hose repositioning.
- Motor has quick response variable speed governor.
- Overload clutch protects feed mechanism.



Model	Motor	Maximu	m Stroke	We	ight	Spindle	Feed Per	Chuck	Inlet	Minimum
	Configuration	in.	mm	lbs	kg	Speeds	ds Revolution	Capacity		Hose Size
400QGDBV-RF-S400	Piggy Back	4"	102	32.5	14.8	55/125, 135/310 325/750	.0005, .001, .002, .003, .004, .006, .008, .012, 016	.5"	.5" NPT	.75"

STANDARD EQUIPMENT: 3 Jaw Chuck 849415 and Key 849121. NOTE:
Specify TOOL NOSE when ordering, Standard Noses page 1-23.
Rated tool performance at 90 PSIG measured at tool inlet with motor running.
When selecting speeds and feeds, see page 1-5.
SEE PAGES 1-11-1-13 FOR SAFETY PRECAUTIONS.

	255/16 (643mm) (78mm)	
77/16		23/s (60mm)
(189mm) 	478/bp (1/5mm)	
	(92am) 1417ap (98mm)	



3-JAW CHUCK	Bushing Thread	Dimension C	Desc.	Part Number
C	.75 - 16LH	3.2813 (83mm)	.5" Chuck	849415
	1 - 14LH	3.2813 (83mm)	Key	849121
	1.25 - 12LH	3.2813 (83mm)		
75777	1.5 - 12LH	3.2813 (83mm)		
	2 - 16LH	3.6875 (85mm)		

In-Line Tools

QUACKENBUSH

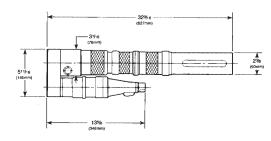
158QGDB-S600 Series

Capacity: Aluminum – 1.25" (32mm) Titanium – 1" (25.4mm) Steel – 1" (25.4mm)

- 158 series motor develops 1.6 nominal horsepo
- Piggy-back motor mount reduces overhang.
- Length of stroke can be adjusted by rotating both forward and rear stroke adjustment collars.
- Drill feed is activated by rotating feed engagement collar.
- Spindle may be returned to starting position at any time during feed cycle by manually rotating feed engagement collar.
- At end of stroke, spindle automatically returns to starting position.
- Available in single governed speeds and variable speed ranges.
- Overload clutch protects feed mechanism.



Model	Motor	Maximu	m Stroke	We	ight	Spindle	Feed Per	Chuck	Inlet	Minimum
	Configuration	in.	mm	lbs	kg	Speeds	Revolution	Capacity		Hose Size
158QGDB-S600	Piggy Back	6"	152.4	25	11.34	55, 80, 95, 110, 125, 135, 150, 185, 250, 310, 400, 535, 660, 900, 1100, 2100, 2870, 3440	.0005, .001, .002, .003, .004, .006, .008, .012, 016	.5"	.375" NP1	.5"
158QGDBV-S600 Variable Speed	Piggy Back	6"	152.4	25	11.34	55-135, 125-310, 265-640, 450-1100, 450-1100, 1460-3440	.0005, .001, .002, .003, .004, .006, .008, .012, 016	.5"	.375" NP1	.5"
STANDARDE COUPMENT: NOTE. 3 Jaw Chuck 849415 and Key 849121. Specify TOOL NOSE when ordering. Standard Noses page 1-25. Flated bod performance at 90 PSG measured at bot or lief with motor running. SEE PAGES 1-11-1-13 FOR SAFETY PRECAUTIONS.					running.					



STEEL TOOL NOSE



Bushing Thread	Length A	Length B	Part Number
1 - 14LH	11.5 (292mm)	10.75 (273mm)	621244
1.25 - 12LH	11.5 (292mm)	10.75 (273mm)	621245
1.5 - 12LH	11.5 (292mm)	10.75 (273mm)	621246
2 - 16LH	11.375 (289mm)	10.625 (270mm)	614757

-



Bushing Thread	Dim. D Side Feed	Dim. D End Feed	Part Number*			
1 - 14LH	9.875 (250mm)	9.4375 (239mm)				
1.25 - 12LH	9.875 (250mm)	9.4375 (239mm)				
1.5 - 12LH	9.875 (250mm)	9.4375 (239mm)				
2 - 16LH	9.75 (247mm)	9.3125 (236mm)				
*See page 1-37 for Selection and Part Number						

| Sushing Thread | Dimension C | Desc. | 1-14LH | 9.2813 (235mm) | .5" Chuck | 1.25 - 12LH | 9.2813 (235mm) | Key | 15 - 12LH | 9.2813 (235mm) | C - 16LH | 9.1563 (232mm) | C - 16LH | 9.1563 (232mm)



Bushing Dim. E No. 1 MT 619533		Dim. E No. 2 MT 619405	Dim. E No. 3 MT 619406	Dim. E No. 4 MT 623931	
1 -14LH	10.0625 (255mm)	10.0625 (255mm)	10.1875 (258mm)	9.875 (252mm)	
1.25 -12LH	10.0625 (255mm)	10.0625 (255mm)	10.1875 (258mm)	9.875 (252mm)	
1.5 -12LH	10.0625 (255mm)	10.0625 (255mm)	10.1875 (258mm)	9.875 (252mm)	
0 40111	0.075 (050)	0.075 (050)	40 000F (0FF)	0.0405 (0.40)	

400QGDBV-S600 Series

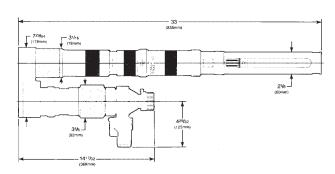
Capacity: Aluminum – 1.25" (32mm) Titanium – 1" (25.4mm) Steel – 1" (25.4mm)

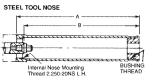
- 400 series motor develops 4.0 nominal horsepower.
- Dial selectable speeds include tamper-resistant speed adjustment lock.
- Feed is activated by rotating feed engagement collar.
- Spindle may be returned to starting position at any time during feed cycle.
- Spindle automatically returns to starting position at end of feed stroke.
- Length of stroke can be adjusted by rotating both the forward and rear stroke adjustment collars.
- Swivel air inlet permits easy air hose repositioning.
- Motor has quick response variable speed governor.
- Overload clutch protects feed mechanism.



Model			m Stroke	We	ight	Spindle		Chuck	Inlet	Minimum
	Configuration	in.	mm	lbs	kg	Speeds	Revolution	Capacity		Hose Size
400QGDBV-S600	Piggy Back	6"	152.4	39	17.7	55-125, 135-310, 325-750	.0005, .001, .002, .003, .004, .006,	.5"	.5" NPT	.75"

STANDARD EQUIPMENT: 3 Jaw Chuck 849415 and Key 849121. NOTE:
Specify TOOL NOSE when ordering, Standard Noses page 1-27.
Rated tool performance at 90 PSIG measured at tool inlet with motor running.
When selecting speeds and feeds, see page 1-5.
SEE PAGES I-11-I-13 FOR SAFETY PRECAUTIONS.

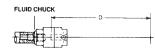




Bushing Thread	Length A	Length B	Part Number
1 - 14LH	11.5 (292mm)	10.75 (273mm)	621244
1.25 - 12LH	11.5 (292mm)	10.75 (273mm)	621245
1.5 - 12LH	11.5 (292mm)	10.75 (273mm)	621246
2 - 16LH	11.375 (289mm)	10.625 (270mm)	614757

3-JAW CHUCK	
c	-
CASSON TO THE STATE OF THE STAT	
1522-41-11-11-11-11-11-11-11-11-11-11-11-11-	T

Bushing Thread	Dimension C	Desc.	Part Number
1 - 14LH	9.2813 (235mm)	.5" Chuck	849415
1.25 - 12LH	9.2813 (235mm)	Key	849121
15 - 12LH	9.2813 (235mm)		
2 - 16LH	9.1563 (232mm)		



Bushing Thread	Dim. D Side Feed	Dim. D End Feed	Part Number*
1 - 14LH	9.875 (250mm)	9.4375 (239mm)	
1.25 - 12LH	9.875 (250mm)	9.4375 (239mm)	
1.5 - 12LH	9.875 (250mm)	9.4375 (239mm)	
2 - 16LH	9.75 (247mm)	9.3125 (236mm)	
*See page 1-37 for Se	election and Part Number		



Bushing Thread	Dim. E No. 1 MT 619533	Dim. E No. 2 MT 619405	Dim. E No. 3 MT 619406	Dim. E No. 4 MT 623931
1 -14LH	10.0625 (255mm)	10.0625 (255mm)	10.1875 (258mm)	9.875 (252mm)
1.25 -12LH	10.0625 (255mm)	10.0625 (255mm)	10.1875 (258mm)	9.875 (252mm)
1.5 -12LH	10.0625 (255mm)	10.0625 (255mm)	10.1875 (258mm)	9.875 (252mm)
2 101 11	0.97E (2E2mm)	0.07E (2E2mm)	10 000E (0EEmm)	0.0125 (2.40mm)

1-27 1-26

In-Line Tools

In-Line Tools

QUACKENBUSH

400QGDABV-S700 Series

Capacity: Aluminum – 2 .5" (63.5mm) Titanium – 1.5" (38.1mm) Steel – 1.5" (38.1mm)

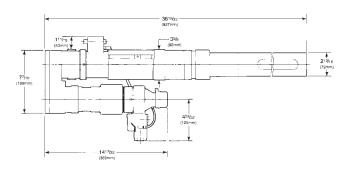
- 400 series motor develops 4.0 nominal horsepower.
- Dial selectable speeds include tamper-resistant speed adjustment lock.
- Swivel inlet permits easy air hose repositioning.
- Length of forward stroke can be changed by adjusting the forward stop mechanism located under cover sleeve. Rear stroke is adjusted by use of rear stroke adjustment wrench.
- Feed mechanism is engaged by sliding conveniently located feed engagement valve.
- Motor has quick response variable speed governor.
- Overload clutch protects feed mechanism.

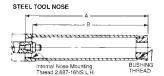


Model	Motor		m Stroke	Wt. w/ne	osepiece	Wt. wo/n	osepiece	Spindle Speeds	Feed Per	Inlet	Minimum
	Configuration	in.	mm	lbs	kg	lbs	lbs kg		Revolution		Hose Size
400QGDABV-S700	Piggy Back	7"	178	51.5	23.36	45.75	20.75	55-125, 135-310,	.0005, .001, .002, .003, .004, .006,	.5" NPT	.75"

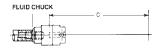
STANDARD EQUIPMENT: Rear Stroke Adjustment Wrench 614189.

NOTE:
Specify TOOL NOSE when ordering, Standard Noses page 1-29.
Rated tool performance at 90 PSIG measured at tool rilet with motor running.
SEE PAGES I-11-I-15 POR SAFETY PRECAUTIONS.





Bushing Thread	Length A	Length B	Part Number
1 - 14LH	13.5625 (345mm)	12.75 (324mm)	621228
1.25 - 12LH	13.5625 (345mm)	12.75 (324mm)	621229
1.5 - 12LH	13.5625 (345mm)	12.75 (324mm)	621230
2 - 16LH	13.4375 (341mm)	12.625 (321mm)	614749



Bushing Thread	Dim. D Side Feed	Dim. D End Feed	Part Number*
1 - 14LH	11.875 (301mm)	11.25 (286mm)	
1.25 - 12LH	11.875 (301mm)	11.25 (286mm)	
1.5 - 12LH	11.875 (301mm)	11.25 (286mm)	
2 - 16LH	11.75 (298mm)	11.1563 (283mm)	
*See page 1-37 for Se	election and Part Number	r	



Bushing Thread	Dim. E No. 2 MT 619832	Dim. E No. 3 MT 619819	Dim. E No. 4 MT 619820
1 - 14LH	12 (305mm)	11.875 (301mm)	11.9375 (303mm)
1.25 - 12LH	12 (305mm)	11.875 (301mm)	11.9375 (303mm)
1.5- 12LH	12 (305mm)	11.875 (301mm)	11.9375 (303mm)
2 - 16LH	11.875 (301mm)	11.8125(299mm)	11.8125(299mm)

1-29

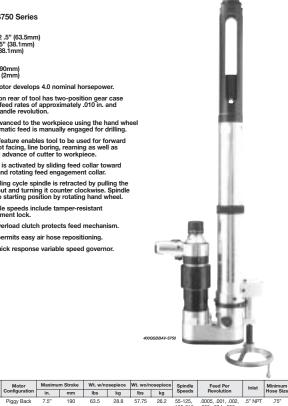
QUACKENBUSH

400QGDBV-S750 Series

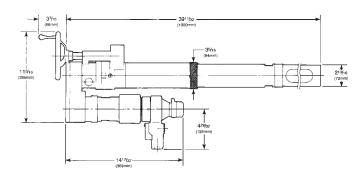
Capacity: Aluminum – 2 .5" (63.5mm) Titanium – 1.5" (38.1mm) Steel – 1.5" (38.1mm)

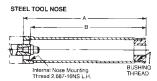
- 400 series motor develops 4.0 nominal horsepower.
- Hand wheel on rear of tool has two-position gear case with manual feed rates of approximately .010 in. and .125 in. per handle revolution.
- Spindle is advanced to the workpiece using the hand wheel and the automatic feed is manually engaged for drilling.
- Hand wheel feature enables tool to be used for forward and back spot facing, line boring, reaming as well as rapid manual advance of cutter to workpiece.
- Drilling cycle is activated by sliding feed collar toward hand crank and rotating feed engagement collar.
- At end of drilling cycle spindle is retracted by pulling the hand crank out and turning it counter clockwise. Spindle is returned to starting position by rotating hand wheel.
- Dial selectable speeds include tamper-resistant speed adjustment lock.
- Automatic overload clutch protects feed mechanism.
- Swivel inlet permits easy air hose repositioning. ■ Motor has quick response variable speed governor.



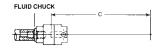


	135-310, .003, .004, .006, 325-750 .008, .012, 016
STANDARD EQUIPMENT: Standard noses page 1-31 specify when ordering.	NOTE: Rated tool performance at 90 PSIG measured at tool inlet with motor running.
	When selecting speeds and feeds, see page I-5.

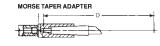




Bushing Thread	Length A	Length B	Part Number
1 - 14LH	13.5625 (345mm)	12.75 (324mm)	621228
1.25 - 12LH	13.5625 (345mm)	12.75 (324mm)	621229
1.5 - 12LH	13.5625 (345mm)	12.75 (324mm)	621230
2 - 16LH	13.4375 (341mm)	12.625 (321mm)	614749



Bushing Thread	Dim. D Side Feed	Dim. D End Feed	Part Numbe
1 - 14LH	11.875 (301mm)	11.25 (286mm)	-
1.25 - 12LH	11.875 (301mm)	11.25 (286mm)	
1.5 - 12LH	11.875 (301mm)	11.25 (286mm)	
2 - 16LH	11.75 (298mm)	11.1563 (283mm)	
*Con page 1 27 for Co	Jaction and Part Number	,	



Bushing Thread	Dim. E No. 2 MT 619832	Dim. E No. 3 MT 619819	Dim. E No. 4 MT 619820	
1 - 14LH	12 (305mm)	11.875 (301mm)	11.9375 (303mm)	
1.25 - 12LH	12 (305mm)	11.875 (301mm)	11.9375 (303mm)	
1.5 - 12LH	12 (305mm)	11.875 (301mm)	11.9375 (303mm)	
2 - 16LH	11.875 (301mm)	11.8125(299mm)	11.8125 (299mm)	

1-30 1-31

QUACKENBUSH

230QGDAB-SU-MS Series

Capacity: Aluminum – 1.25" (31.75mm) Titanium – .875" (22.2mm)

■ 230 series motor develops 2.3 nominal horsepower.

- Single push-button starts motor and engages drill feed mechanism.
- Externally replaceable shear pin provides gear protection if chips pack or cutter binds.
- Rapid advance with manual speed control and low torque clutch protection if cutter advances into workpiece.
- Easily adapted to oil hole drilling using a solid spindle and a fluid chuck, or with the use of an oil hole spindle and a fluid swivel.
- Stroke is adjustable by positioning the stop collar.
- Spindle continues to rotate in forward direction on return stroke to eliminate withdrawal spiral in hole.
- Rapid spindle retraction.
- Spindle can be retracted at any point during feed cycle by lifting retract lever.
- Precision depth control with automatic retract after preset dwell period. (When equipped with depth sensing nose assembly)
- Positive depth stop is adjustable for desired hole depth.
- Cutter automatically retracts if tool senses thrust overload.
- Motor shuts off automatically after retract.



Model	Motor	Maximum Stroke		Weight*		Length		Spindle	Feed Per	Inlet	Minimum
model	Configuration	in.	mm	lbs	kg	in.	mm	Speeds	Revolution	milet	Hose Size
230QGDAB-SU-MS	Piggy Back	NO L	IMIT	17.5	7.9	27 .375	695	75, 97, 120, 150, 188, 240, 307	.0005, .001, .002, .003, .0045, .006, .008, .012	.5" NPT	.5"
230QGDAB-SU-MS	Piggy Back	NO L	IMIT	16.25	7.4	25 .375	644	390, 480, 585, 680, 825, 960 1155, 1500	.0005, .001, .002, .003, .0045, .006, .008, .012	.5" NPT	.5"
230QGDABV-SU-MS	Piggy Back	NO L	IMIT	18.8	8.2	27 7/8	707	75/187, 150/375	.0005, .001, .002, .003, .0045, .006, .008, .012	.5" NPT	.5"
230QGDABV-SU-MS	Piggy Back	NO L	IMIT	16.75	7.6	25 7/8	657	330/780 600/1500	.0005, .001, .002, .003, .0045, .006, .008, .012	.5" NPT	.5"

WHEN ORDERNIST TOL:
Told noise and spinide must be specified.
Standard fool noise and spinide must be specified.
Standard fool noise, spinide guards and spinides are provided at no charge when ordered with fool. Select one tool noise and one spinide.
Other tool noises and spinides are available at extra charge.
Speciff ETHER 25°C. H. E. External Thread Off. 15:55°C. 20°C. H. Internal Thread.

STANDARD TOOL NOSE

'A'	2 1/4" 2/MENC - FLATS 57 M/6	
	238°DA 238°DA 251 W46	
Z 1/4720 UNIL THREAD FUR ATTRIBUTED TO TOOL	2 16 UN _ P PLAD POR DR I , BUSHING	

STEEL TOOL NOSES (Select One)

Length "A"	Thread	Part No.
S400 SERIES		
9.5" (241mm)	.75" - 16 L.H.	621235
9.5" (241mm)	1" - 14 L.H.	621236
9.5" (241mm)	1.25" - 12 L.H.	621237
9.5" (241mm)	1.5" - 12 L.H.	621238
9.375" (238mm)	2" - 16 L.H.	614751
S600 SERIES		
11.5" (282mm)	1" - 14 L.H.	621244
11.5" (282mm)	1.25"- 12 L.H.	621245
11.5" (282mm)	1.5"- 12 L.H.	621246
44 0758 (070)	0" 40 1 11	04 4757

STANDARD SPINDLES



- 2.25"-20 L.H. Nose Thread Attachment on standard tool accepts \$400 and \$600 Tool Noses and accessories. For close quarter applications, a special tool with 1.5625"-20 L.H. Internal Nose Attachment Thread is available.

 With the 1.5625"-20 L.H. Internal Thread, order Nose Adapter (614244) to attach \$150 and \$275 (2" O.D.) Tool Noses and accessories, OR Nose Adapter (614228) to attach \$400 and \$600 (2.375" O.D.) Tool Noses and accessories.

 (See pg. 2-25". Dol Nose Thread use (381326); for 2.25".20 LN. Nose Thread use (381326); for long the standard of the standard standa

SPINDLES (Select One)

Spindle	Length	Max.		
Type	"B"	Stroke	Thread Description	Part No
Oil Hole	9" (229mm)	4" (103mm)	.5625"-18 Internal Thread with Counterbore and 118° Angle	38259
Oil Hole	9" (229mm)	4" (103mm)	.625"-18 Internal Thread with Counterbore and 118° Angle	38234
Solid	9" (229mm)	4" (103mm)	No. 2 Short Morse Taper with side Knock-Out	38262

- When adapting a 3-jaw chuck to .5625*-I8 Internal Thread Spindle, order Chuck Adapter (623643) for .75* cap. chuck OR Chuck Adapter (613400) for .5* cap chuck. (See pgs. 1-36)
 Fluid Swives used with oil hole spindles and selection of Fluid Chucks. (See pg. 1-37)
 Other Noses and Spindles are available at extra charge. (See pg. 2-21)

1-33

QUACKENBUSH

140QGDAB-SU-MS Series

Capacity: Aluminum – .5625" (14.3mm) Titanium – .4375" (11.1mm) Steel – .4375" (11.1mm)

Stroke: Min. – .3125" (8mm) Max. – Unlimited

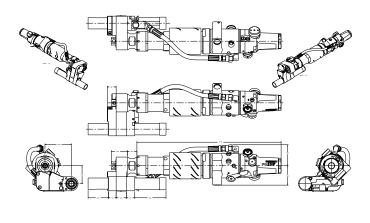
- 140 series motor develops 1.4 nominal horsepower.
- Single push-button starts motor and engages drill feed mechanism.
- Motor shuts off automatically after retract.
- Externally replaceable shearpin.
- Rapid advance with manual speed control and low torque clutch protection.
- Precision depth control.

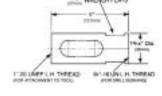
 Cutter automatically retracts if tool senses thrust overload.

- Motor shuts off after auto retract.Adjustable stroke.

- Positive depth stop.
 Easily adapted to oil hole drilling.
- Auxilliary manual retract lever.Push-button emergency stop.







Spindle Type	Length "B"	Max. Stroke	Thread Description	Spindle Part No.	Spindle Guard No
Solid	6" (152mm)	2.75" (70mm)	.375"-24 Internal Thread with Counterbore	615747	624342
Oil Hole	6" (152mm)	2.75" (70mm)	.375"-24 Internal Thread with Counterbore	623812	624332



Model	Motor	Maximum Stroke		Weight*		Maximum Length			Feed Per	Inlet	Minimum
model	Configuration	in.	mm	lbs	kg	in.	mm	Speeds	Revolution	milet	Hose Size
140QGDAB-SU-MS	In-Line	No I	_imit	10.75	4.88	19.875	505	190, 300, 400 520, 760, 116 2000, 2800		.375" NPT	.5"

"Weight and Length will vary depending on rpm specified.
Rated tool performance at 90 PSIG measured at tool inlet with motor running.
When selecting speeds and feeds, see page I-5.
SEE PAGES I-11—I-13 FOR SAFETY PRECAUTIONS.

- Order Tool Nose Adapter (632701) to attach \$125 & \$300 Tool Noses (1,75° C.D.) and accessories.

 Order Tool Nose Adapter (632702) to attach \$150 & \$275 Tool Noses (2° 0. D.) and accessories

 Order Clouk Adapter (619136) when utilizing 3-jaw chuck with .375 -24 Internal Thread Spindles.
 - Fluid Swivel (631256) used with Oil Hole Spindles, and selection of Pluid Chucks.
 Fluid Chucks used with .375 -24 Internal Thread Spindles.
 Other Noses and Spindles are available as required
 Nose Indexe (631864)

1-34 1-35

230QGDAB-SU-MS

Depth and Dwell Attachment
The Quackenbush Depth Control or Countersink Attachment is a high quality, precision attachment for the 230 Series Positive Feed Dill which is used to precisely control the depth of drilled and reamed, straight or tapered holes on both flat or contoured surfaces. The attachment is also used for precision countersink operations. This attachment has been proven on the most

demanding hole preparation jobs in the aircraft industry, and has earned the reputation for producing exceptionally high quality holes with precise depth accuracy, roundness and a high level of finish.

How the depth and dwell attachment operates

Threaded to the end of the Depth and Dwell Attachment is a DRILL BUSHING (3) which is used to secure the unit to the tooling fixture (2). A tubular SENSING SLEEVE (6) is plotted by and sildes axially inside the DRILL BUSHING (3). The SENSING SLEEVE surrounds and pilots the CUT ① and the SPINDLE ②. It is SPRING ② biased to engage the WORKPIECE ① and seat against it ③. The primary function of the SENSING SLEEVE is to provide a positive, definite stopping surface that is a precise repeatable distance from the workpiece.

■ Finish

Attached to SPINDLE (® is a patented micrometer type, ADJUSTABLE ROTATING STOP (® with a self-contained anti-friction bearing designed to engage the SENSING SLEEVE when the CUTTER has achieved the desired

depth.

Once the pre-determined depth has been reached, the advancement of the CUTTER is stopped by the engagement of the ADUSTABLE STOP on the SPINDLE contacting the SENSING SLEEVE. This allows the CUTTER to dwell (continue rotation without further feed) and reached the depth of the ADUSTABLE STOP on the SPINDLE contacting the SENSING SLEEVE. This allows the CUTTER to dwell (continue rotation without further feed) and produce the desired hole characteristics.

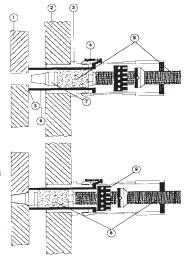
The Model 230 Drill (furnished under separate order) features automatic thrust activated retract, torque overload shear pin, and automatic motor stop after retract.

When mounted on the Model 230 Positive Feed Drill,

the common SPINDLE @ extends through and is driven by the right angle drill head. Spindles (up to 15" long) will be hollow for coolant flow.

A fluid inducer (Part No. 381213) may be purchased for the remote end of the spindle. Rear spindle guards must be used on all applications. NOTE: Models designed for 1.186 maximum diameter cutters are

common. Larger units for 1.750 maximum diameter cutters are available. Shortened models are available for short strokes in confined work areas.

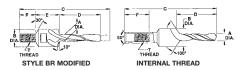


1 STAND-GFF (Top of Tooling Plate to Work Surface) CUTTER NUMBER AND GROUP
 (Furnish drawing or dimensional d

Depth and Dwell attachments are designed for each tooling application. The following information is required in order to obtain a quotation from the factory, Contact your local Quackenbush Specialist for assistance.

- Stand Off:_____inches. (Minimum chip clearance .375")
 Drill Bushing Tip Outside Diameter:___
 Drill Bushing Series (Circle One):
 *2 Lock 22,000, 23,000 & 24,000 Series
 *3 Lock 25,000, 26,000 Series
 Cutter Information:
 *Style (reference drawings at bottom of this page):
 * Furnish cutter Drawing or Dimensional Data (reference drawings a ence drawings at bottom of this page) _ Internal Thread s ____ No ___ Fluid Spindle: Yes
- Nose Indexer: Yes No 6 Quackenbush Tool Model No.
- NOTE: Important— If chip escape reliefs are required on the sensing sleeve, they must be specified when ordering. A drawing must be provided showing the exact location and type openings required.
 Some applications involving long cutters require that the tips of the cutter extend beyond the Dwell and Depth Attachment when the spindle is fully retracted.



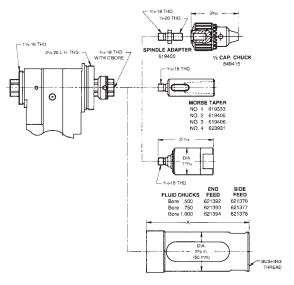


FOR OTHER CUTTER STYLES, FURNISH CUTTER DRAWING

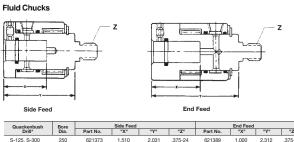
1-37 1-36

In-Line Tool Accessories In-Line Tool Accessories

Accessories for the No. 230 B & RA Series Right Angle Drills



Bushing	S400	Series	S600 S	Series
Thread	Dim. A	Part No.	Dim. A	Part No.
1" - 14 L.H.	9.5 in. (241mm)	661236	11.5 in. (292mm)	621244
1.25" - 12 L.H.	9.5 in. (241mm)	621237	11.5 in. (292mm)	621245
1.5" - 12 L.H.	9.5 in. (241mm)	621238	11.5 in. (292mm)	621246
2" - 16 L H	9.375 in.	614751	11.375 in.	614757



Quackenbush	Bore		Side Feed				End Feed		
Drill*	Dia.	Part No.	"X"	"Y"	"Z"	Part No.	"X"	"Y"	"Z"
S-125, S-300	250	621373	1.510	2.031	.375-24	621389	1.000	2.312	.375-24
S-265	.375	621374	1.510	2.031	.375-24	621390	1.000	2.312	.375-24
S-150, S-275	.500	621375	1.510	2.031	.375-24	621391	1.000	2.312	.375-24
S-400, S600	.500	621376	1.510	2.406	.5625-18	621392	1.437	3.000	.5625-18
S-400, S600	.750	621377	1.510	2.406	.5625-18	621393	1.687	3.000	.5625-18
S-400, S600	1.000	621378	1.510	2.406	.5625-18	621394	1.687	3.000	.5625-18
S-700, S750	1.000	621408	1.510	2.406	.75-16	621395	1.687	3.000	.75-16

*Stroke length. Note: Dimensions X & Y are reference.



Quackenbush Drill	Model	Part No.	A	В	С
230B & RA	12.5 TPI SPINDLES	381213	1.5625	1.75	.5



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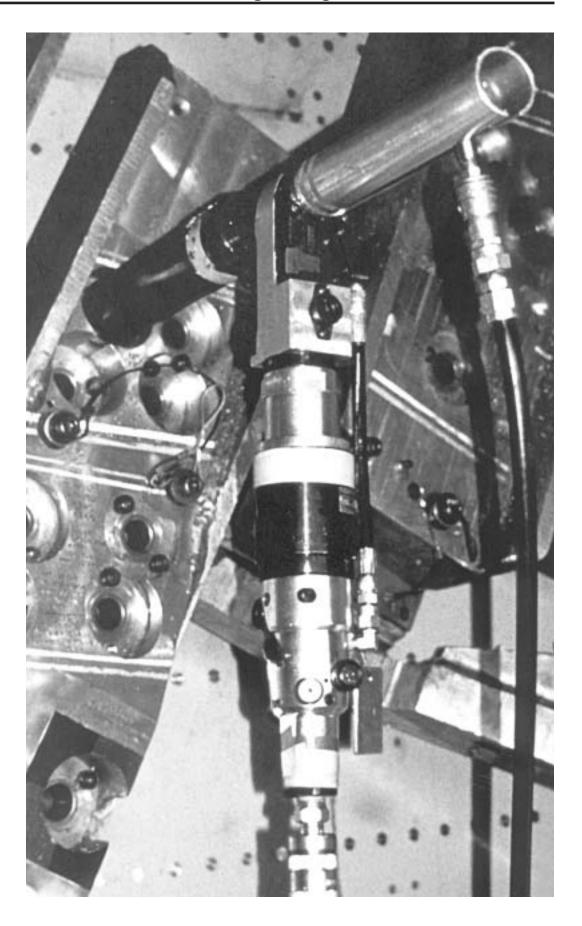
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Introduction

Right Angle Positive Feed Tools

Our positive feed drill motors are available in both

Our positive feed drill motors are available in both in-line and right angle configurations (please also see the in-line tool section), The right angle tools are rapidly growing in popularity due to their compact size, light weight and ease of operation. In-line drills have a limited stroke, but with a right angle drill a deeper stroke can be achieved by simply applying a longer spindle and nosepiece. In addition, the fixtures do not have to be as robust with a right langle drill which represents a significant. with a right angle drill, which represents a significant cost savings. The tools themselves weigh less and in use are closer to the fixture, resulting in less deflection of the fixture. Right angle tools have also

been shown to reduce operator fatigue.

In general, positive feed drills are used for the larger holes and heavier structures in the aircraft industry such as the spars and the ribs, primarily in

landing gear, wing and fuselage joins.

Positive feed drills produce a hole in a predictable and constant time. With each revolution of the spindle,

the cutter travels a precise distance, i.e., one

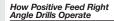
thousandth of an inch or three-thousandths of an inch depending on the settings. This is true whether the tool is drilling air or drilling a tough alloy. The

benefit is that burns caused by surging of the cutter on the exit side of the cycle are virtually eliminated. Since the cutter advances a precise

distance with each revolution, the cutter does not rotate without cutting. This reduces heat and deformation, resulting in less chance of the material work hardening.

Many of the accessories for our

in-line and right angle tools are interchangeable, such as chucks, nose pieces, motors and gears.



The fixed rate of spindle advancement (feed) for each rotation of the drill spindle in right angle tools is accomplished by differential gearing. The spindle of a right angle drill has external left-hand threads and four drive grooves that run the length of the spindle. The spindle fits into and through two gears: the spindle drive gear and the spindle feed gear.

The spindle drive gear has internal

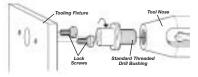
The spirilled rive gear has interfair male spilines that engage the drive grooves on the spindle. When the air motor is turned on, the spindle drive gear rotates, turning the spindle. The spindle feed gear is threaded internally to match the external thread of the spindle, and its function is to

advance or retract the spindle. When this gear advance or retract the spindle, the spindle will feed. When it stops, the spindle will retract. The desired feed rate is obtained by the differential gear ratio between the spindle drive and spindle feed gears.

At the completion of the drilling cycle, the feed stop collar contacts the feed engagement lever, lifting the differential feed gear and locking it in a stationary position. With the spindle continuing to rotate in a forward direction and the spindle feed gear held stationary, the spindle automatically retracts. This action occurs approximately three times faster than the advancement cycle. Depending on the positive feed model selected, the tool is shut down either manually or automatically.

Taper-Lok Fixturing

Customized fixtures are constructed to accept Taper-Lok Bushing Tips. Advanced Drilling Equipment tools with the Bushing Tips are inserted into the fixture, twisted and cam-locked into place.



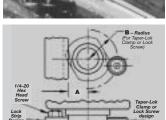
The Bushing Tip's tapered flanges fit under the shoulder of lock screws in the fixture. The Bushing Tip holds the tool in alignment and absorbs the thrust and torque of drilling. At the completion of the drilling cycle, the tool is rotated to unlock, withdrawn from the fixture and moved to the next position. Several different types of Taper-Lok Fixturing are available. The following are the most common.





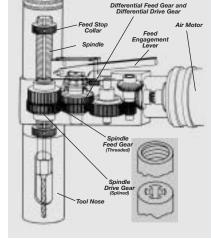






Location Data for Taper-Lok Clamp, Lock Screw, and Lock Strip Mounting

Drill Bushing Tip Series	А	В	Tool Nose Thread (I.D.)
21000	.312	.625	3/4-16
22000	.609	.922	1-14
23000	.734	1.047	1 1/4-12
24000	.859	1.172	1 1/2-12
25000	None	1.562	2-16



2-2

Right Angle Tools Right Angle Tools

QUACKENBUSH

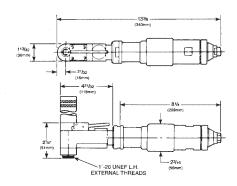


Model	Motor	Maximum Stroke		Weight		Maximum Length				Inlet	Minimum
model	Configuration	in.	mm	lbs	kg	in.	mm	Speeds	Revolution	milet	Hose Size
15QD-RAB-SU-RS	Right Angle	No I	imit	5	2.27	13 3/8	34	160, 265, 335, 465, 660, 1000, 1650	.0005, .001, .002, .003, .006	.375" NPT	.375"

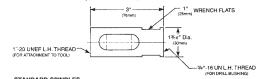
STANDARD EQUIPMENT:
Noses and spindles must be specified when ordering.
Rated tool performance at 90 PSIG measured at tool inlet with motor running.
When selecting speeds and feeds, see page 1-5.
When selecting speeds and reded, see page 1-5.
SEE PAGE 2-20 – 2-23 FOR TOOLING ACCESSORIES.

WHEN ORDERING TOOL:

Tool nose and spindle must be specified. Standard tool noses, spindle guards and spindles are provided at no charge when ordered with tool. Select one tool nose and one spindle. Other tool noses and spindles are available at extrictange – see page 2-24.



. STANDARD TOOL NOSE (PART NO. 614905)



· STANDARD SPINDLES



SPINDLES (Select One)

SFINE	JLLS (S	elect Oi	ie)	
Spindle Type	Length "B"	Max. Stroke	Thread Description	Part No.
Solid	4" (101mm)	1.12" (29mm)	.25"-28 Internal Thread	623266
Solid	4" (101mm)	1.12" (29mm)	.375"-24 Internal Thread with Counterbore	615915

2-5

- Order Tool Nose Adapter (614722) to attach S125 & S300 Tool Noses (1.75* O.D.) and accessories. (See page 2-24)
 Order Tool Nose Adapter (614973) to attach S150 & S275 Tool Noses (2* 0.D.) and accessories (See page 2-24)
 Order Chuck Adapter (619136) when utilizing 3-jaw chuck with .375 -24 Internal Thread Spindles.

- Fluid Swivel (631256) used with Oil Hole Spindles, and selection of Fluid Chucks. (See page 2-23)
 Fluid Chucks used with .375 -24 Internal Thread Spindles.
 Other Noses and Spindles are available as required (see page 2-24).

 Nose Indexer (631249)

Right Angle Tools Right Angle Tools

QUACKENBUSH

2-6

15QDA-RAB-SU-RS-RF Series Back Spotfacer



Model	Motor	Maximum Stroke				Maximu	n Length		Feed Per	Inlet	Minimum
model	Configuration	in.	mm	lbs	kg	in.	mm	Speeds	Revolution	milet	Hose Size
15QDA-RAB-SU-RS-R	F Right Angle	No I	Limit	5	2.27	13 3/8	34	160, 265, 335 465, 660 1000, 1650	, .0005, .001, .002, .003, .006	.375" NPT	.375"

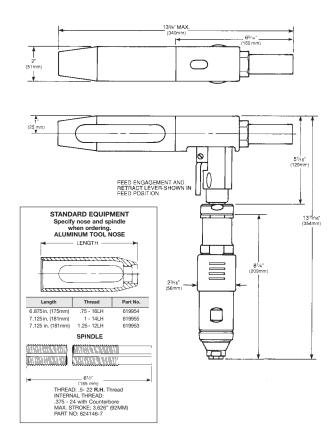
STANDARD COUPMENT:

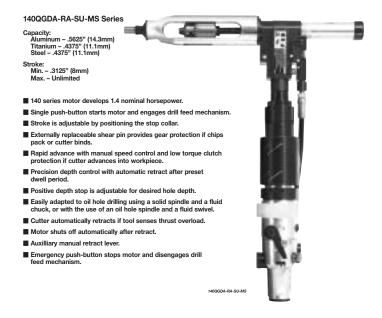
Notes and pirrules must be specified when ordering.

Hade too performance at 50 PSIG measured at too linet with motor running.

SEE PAIGES 1:11-1:15 CR SAFETY PRECAUTIONS.

SEE PAIGE 2:11-2-25 PCR TOOLOUGH. ACCESSORIES.





Model	Motor	Maximum Stroke		Weight		Maximum Length			Feed Per	Inlet	Minimum Hose Size
model	Configuration	in.	mm	lbs	kg in. mm Speeds R	Revolution	mict				
140QGDA-RA-SU-MS	Right Angle	No I	_imit	10.75	4.88	19.875	505	95, 150, 200, 260, 380, 580, 1000	.0005, .001, .002, .003, .006	.375" NPT	.5"
140QDA-RA-SU-MS	Right Angle	No I	_imit	10.75	4.88	19.875	505	1,400	.0005, .001, .002, .003,	.375" NPT	.5"

STANDARD EQUIPMENT:
Noise and spiridles must be specified when ordering.
Noise and spiridles must be specified when ordering.
When selecting speeds and feeds, see page 1-8.
SEE PAGES 1-11-113 FOR SAFETY PRECAUTIONS.
SEE PAGE 2-20 -2-225 FOR TOOUNG ACCESSORIES.

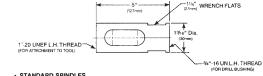
2-8

.006

WHEN ORDERING TOOL:
Tool nose and spindle must be specified. Standard tool noses, spindle guard and spindle are provided at no charge when ordered with tool. Select one tool nose Other tool nose and smintle.

 Θ Θ

. STANDARD TOOL NOSE (PART NO. 614919)



- STANDARD SPINDLES

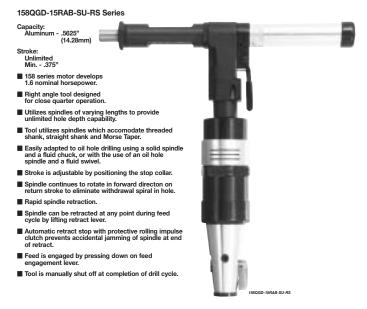


SPIND	LES (S	elect On	e)		
Spindle Length Type "B"		Max. Stroke	Thread Description	Spindle Part No.	Spindle Guard No.
Solid	6" (152mm)	2.75" (70mm)	.375"-24 Internal Thread with Counterbore	615747	624342
Oil Hole	6" (152mm)	2.75" (70mm)	.375"-24 Internal Thread with Counterbore	623812	624332

- Order Tool Nose Adapter (629222) to attach S125 & S300 Tool Noses (1.75* O.D.) and accessories. (See page 2-24)
 Order Tool Nose Adapter (629224) to attach S150 & S275 Tool Noses (2* 0.D.) and accessories (See page 2-24)
 Order Chuck Adapter (619136) when utilizing 3-jaw chuck with .375 -24 Internal Thread Spindles.

- Fluid Swivel (631256) used with Oil Hole Spindles, and selection of Fluid Chucks. (See page 2-23)
 Fluid Chucks used with .375 -24 Internal Thread Spindles.
 Other Noses and Spindles are available as required (see page 2-24).

 Nose Indexer (631864)

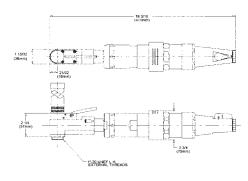


Model	Motor	Maximu	m Stroke	Wei	ght	Maximur	n Length		Feed Per	Inlet	Minimum
	Configuration	in.	mm	lbs	kg	in.	mm	Speeds	Revolution		Hose Size
158QGD-15RAB-SU-F	RS Right Angle	No I	Limit	9.25	4.2	16 3/16	411	1000, 2000	.0005, .001, .002	.375" NPT	.5"

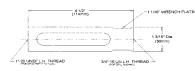
STANDARD EQUIPMENT:
Noses and spindles must be specified when ordering.
Rated tool performance at 90 PSIG measured at tool inlet
When selecting speeds and feeds, see page I-5.
SEE PAGES I-11-1-13 FOR SAFTEY PRECAUTIONS.
SEE PAGES 2-20 – 2-23 FOR TOOLING ACCESSORIES.

WHEN ORDERING TOOL:
Tool nose and spindle must be specified. Standard tool nose, spindle guard and
Tool nose and spindle in charge when ordered with tool. Select one tool
nose and one spindle.

Other tool noses and spindles are available at extra charge — see page 2-24.



STANDARD STEEL TOOL NOSE (Part No. 615460)



STANDARD SPINDLES



SPINDLES (Select One)

Spindle Type	Length "B"	Max. Stroke	Thread Description	Part No.
Solid	6" (152mm)	3.12" (79.4mm)	.375"-24 Internal Thread with Counterbore	615747
Oil Hole		3.12" (79.4mm)	.375"-24 Internal Thread with Counterbore	623812

- Order Tool Nose Adapter (614722) to attach S125 & S300 Tool Noses (1.75° O.D.) and accessories. (See page 2-24)
 Order Tool Nose Adapter (614973) to attach S150 & S275 Tool Noses (2*0 D.) and accessories (See page 2-24)
 Order Chuck Adapter (619136) when utilizing 3-jaw chuck with .375 -24 Internal Thread Spindles.

- Fluid Swivel (631256) when used with Oil Hole Spindies, and selection of Fluid Chucks used with 375 -24 Internal Thread Spindies, (See page 2-23) Other Noses and Spindles are available as required (see page 2-24).
 Nose Indexer (631249)

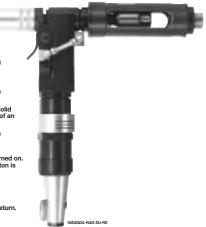
2-10 2-11

158QGDA-RAD-SU-RS Series

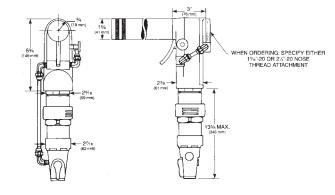


Stroke: Min. - .5" (12.7mm) Max. - Unlimited

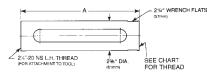
- 158 series motor develops 1.6 nominal horsepower.
- Spindle rotates in forward direction during return stroke.
- Rapid spindle retraction.
- Use of spindles of varying lengths enables tool to drill holes in confined quarters.
- Easily adapted to oil hole drilling using a solid spindle and a fluid chuck, or with the use of an oil hole spindle and a fluid swivel.
- Tool utilizes spindles which accommodate threaded shank, Morse Taper, straight shank, reamers and fluid chucks.
- Spindle begins to rotate when motor is turned on. Tool begins to feed when feed control button is depressed.
- Spindle may be retracted at any point during drilling cycle.
- At end of stroke, stop collar on spindle trips retract lever, causing the spindle to return.
- Tool must be manually shut off.
- Automatic retract stop with protective rolling impulse clutch prevents accidental jamming of spindle at end of retract.
- Spindle guard protects operator.



Model	Motor	Maximu	m Stroke		Feed Per	Inlet	Minimum		
model	Configuration	in.	mm	lbs	kg	Speeds	Revolution	milet	Hose Size
158QGDA-RAD-SU-RS	Right Angle	No I	imit	12.5	5.67	47, 56, 70, 94, 110, 120, 140, 185, 194, 230, 288, 380, 388, 460, 485, 570 760, 950	.0005, .001, .002, .0035, .0055, .0075	.375" NPT	.5"
158QGDAV-RAD-SU-RS	Right Angle	No I	_imit	12.5	5.67	47/120, 92/230 194/485, 380/950	.0005, .001, .002, .0035, .0055, .0075	.375" NPT	.5"



STANDARD STEEL TOOL NOSE



Length "A"	Thread	Part No.
S400 SERIES		
9.5" (241mm)	.75" - 16 L.H.	621235
9.5" (241mm)	1" - 14 L.H.	621236
9.5" (241mm)	1.25" - 12 L.H.	621237
9.5" (241mm)	1.5" - 12 L.H.	621238
9.375" (238mm) 2" - 16 L.H.	614751
S600 SERIES		
11.5" (282mm)	1" - 14 L.H.	621244
11.5" (282mm)	1.25"- 12 L.H.	621245
11.5" (282mm)	1.5"- 12 L.H.	621246
11.375" (279m) 2" - 16 L.H.	614757

STEEL TOOL NOSES (Select One)

STANDARD SPINDLES

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(25mn	
STORY OF THE STORY	i an digadallanah melang Jenta
(100) mark that	Marie marentalian come cititian. attitute 130 miles in
ALEGE BALLET BALL	<i>र केत्र प्रमुख्य कुरावका</i> कार्यात्र संस्थान । त्या क्रियात
	. «D

- When adapting a 3-jaw chuck to .5625-18 internal thread spindle, order Chuck Adapter (623643) for .375" cap. chuck OR Chuck Adapter (619400) for .5" cap. chuck.
- Fluid Swivels used with oil hole spindles and selection of Fluid Chucks (see page 2-23).

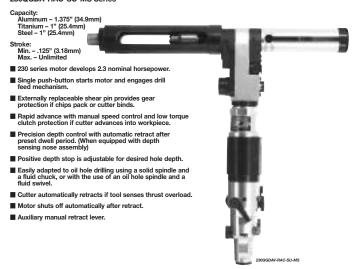
SPINDLES (Select One)

Spindle Type	Length "B"	Max. Stroke	Thread Description	Part No.
Oil Hole	9.25" (235mm)	5.5" (140mm)	.5625"-18 Internal Thread with Counterbore and 118° Angle	623955
Oil Hole	9.25" (235mm)	5.5" (140mm)	.625"-18 Internal Thread with Counterbore and 118° Angle	615964
Solid	9" (229mm)	5.25" (133mm)	No. 2 Short Morse Taper with Side Knock-Out	614470
Solid	9"	5.25"	.5625"-18 Internal Thread with	615319

- Other Noses and Spindles are available on request (see page 2-24).
 Nose Indexers 1.5625 20 (381325) 2.25 20 (381327) Use with 615705 nose adapter.

2-12 2-13

230QGDA-RAC-SU-MS Series



Model	Motor		m Stroke	Weig	ght*	Len	gth*	Spindle	Feed Per	Inlet	Minimum
model	Configuration	in.	mm	lbs	kg	in.	mm	Speeds	Revolution	milet	Hose Size
230QGDA-RAC-SU-MS	Right Angle	No I	_imit	17	7.7	20.75	527	50, 65, 80, 100, 125, 160, 205	.0005, .001, .002, .003, .0045, .006, .008, .012	.5" NPT	.5"
230QGDA-RAC-SU-MS	Right Angle	No I	_imit	15.75	7.1	18.75	476		.0005, .001, .002, .003, .0045, .006, .008, .012	.5" NPT	.5"
230QGDAV-RAC-SU-MS	Right Angle	No I	_imit	17.5	7.9	21.25	549	50/125 100/250	.0005, .001, .002, .003, .0045, .006, .008, .012	.5" NPT	.5"
230QGDAV-RAC-SU-MS	Right Angle	No I	_imit	16.25	7.4	19.25	489	210/520 420/1000	.0005, .001, .002, .003, .0045,	.5" NPT	.5"

*Weight and Length will vary depending on Gear Train.

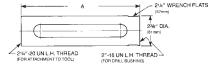
NOTE: Tool model with either the 2.25"-20 L.H. External Nose Attachment Thread (Standard) or the 1.5625"-20 Internal Thread (Special) must be specified

.006, .008, .012

SEE PAGES I-11-13 FOR SAFETY PRECAUTIONS.
SEE PAGE 2-20 -2-23 FOR TOOLING ACCESSORIES.
WHICH ORDERING TOOLING ACCESSORIES.
WHICH ORDERING TOOLING TOOLING STANDARD TOOLING TOOLING STANDARD TOOLING TOOLING

0 21/4"-20 L.H. EXTERNAL THREAD-STANDARD 1%16"-20 L.H. INTERNAL THREAD FOR CLOSE QUARTER APPLICATIONS.

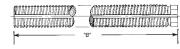
STANDARD TOOL NOSE



STEEL TOOL NOSES (Select One) Length "A" Thread Part No.

S400 SERIES		
9.5" (241mm) .75"	- 16 L.H.	621235
9.5" (241mm) 1"	- 14 L.H.	621236
9.5" (241mm) 1.25"	- 12 L.H.	621237
9.5" (241mm) 1.5"	 12 L.H. 	621238
9.375" (238mm) 2"	- 16 L.H.	614751
S600 SERIES		
11.5" (282mm) 1"	- 14 L.H.	621244
11.5" (282mm) 1.25"	- 12 L.H.	621245

STANDARD SPINDLE



- 2.25"-20 Nose Thread Attachment on standard tool accepts S400 and S600 Tool Noses and accessories.

 For close quarter applications, a special tool with 1.5625"-20 L.H. Internal Nose Attachment Thread is
- 1.5620°-20 Lh. Internal Thread, order Nose Adapter (614244) to attach \$150 and \$275 (2° 0.D.) Tool Noses and accessories, OR Nose Adapter (614228) to attach \$400 and \$600 (2.375° 0.D.) Tool Noses and accessories. (See page 2.24)

SPINDLES (Select One)

	Spindle Type	Length "B"	Max. Stroke	Thread Description	Part No.
-	Oil Hole	9" (229mm)	4" (103mm)	.5625"-18 Internal Thread with Counterbore and 118° Angle	382599
	Oil Hole	9" (229mm)	4" (103mm)	.625"-24 Internal Thread with Counterbore and 118° Angle	382346
	Solid	9" (229mm)	4" (103mm)	No. 2 Short Morse Taper with Side Knock-Out	382628

- Nose Indexers For 1.5625*-20 nose threads use 381326; For 2.25*-20 use 381327 + 615705 Nose Adapter.

 When adapting a 3-jaw chuku to .5625 18 Internal Thread Spindle, order Chuck Adapter (823643) for .375* cap. chuck OR Chuck Adapter (619400) for .5* cap. chuck (See page 2-22).

 Fluid Swivels used with oil hole spindles and selection of Fluid Chucks. (See page 2-23)

 Other Noses and Spindles are available at extra charge. (See page 2-2-4)

2-14 2-15 Right Angle Tools Right Angle Tools

QUACKENBUSH

230QGDA-RAC-SU-MS

Depth and Dwell Attachment
The Quackenbush Depth Control or Countersink Attachment is a high quality, precision attachment for the 230 Series Positive Feed Dill which is used to precisely control the depth of drilled and reamed, straight or tapered holes on both flat or contoured surfaces. The attachment is also used for precision countersink operations. This attachment has been proven on the most

demanding hole preparation jobs in the aircraft industry, and has earned the reputation for producing exceptionally high quality holes with precise depth accuracy, roundness and a high level of finish.

How the depth and dwell attachment operates

■ Start

Threaded to the end of the Depth and Dwell Attachment is a DRILL BUSHING ® which is used to secure the unit to the tooling fixture ®. A tubular SENSING SLEEVE ® is piloted by and slides axially inside the DRILL BUSHING ®. The SENSING SLEEVE surrounds and pilots the CUTTER ® and the SPINDLE ®. It is SPRING ® biased to engage the WORKPIECE © and seat against it ®. The primary function of the SENSING SLEEVE is to provide a positive, definite stopping surface that is a precise repeatable distance from the workpiece.

2-16

Attached to SPINDLE ® is a patented micrometer type, ADJUSTABLE ROTATING STOP ® with a selfcontained anti-friction bearing designed to engage the SENSING SLEEVE when the CUTTER has achieved the desired depth. Once the pre-determined depth has been reached,

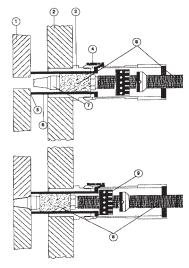
the advancement of the CUTTER is stopped by the engagement of the ADJUSTABLE STOP on the SPINDLE contacting the SENSING SLEEVE. This allows the CUTTER to dwell (continue rotation without further feed) and produce the desired hole characteristics.

The Model 230 Right Angle Drill (furnished under

separate order) features automatic thrust activated retract, torque overload shear pin, and automatic motor stop after retract.

When mounted on the Model 230 Right Angle

When mounted on the Model 230 Hight Angle
Positive Feed Drill, the common SPINDLE ® extends
through and is driven by the right angle drill head.
Spindles (up to 15" long) will be hollow for coolant flow. A fluid
inducer (Part No. 381213) may be purchased for the remote end of
the spindle. Pear spindle guards must be used on all applications.
NOTE: Models designed for 1.186 maximum diameter cutters are
common. Larger units for 1.750 maximum diameter cutters are
residated. Steptond madeling one multible for exhost territories in available. Shortened models are available for short strokes in confined work areas.



1 STAND-GFF (Top of Tooling Plate to Work Surface) CUTTER NUMBER AND GROUP
 (Furnish drawing or dimensional d

Depth and Dwell attachments are designed for each tooling application. The following information is required in order to obtain a quotation from the factory. Contact your local Quackenbush Specialist for assistance.

2-17

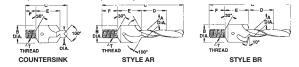
- Stand Off:_____inches. (Minimum chip clearance .375")
 Drill Bushing Tip Outside Diameter:___
 Drill Bushing Series (Circle One):
 *2 Lock 22,000, 23,000 & 24,000 Series
 *3 Lock 25,000, 26,000 Series
 Cutter Information:
 *Style (reference drawings at bottom of this page):
 * Furnish cutter Drawing or Dimensional Data (reference drawings a

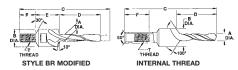
- nce drawings at bottom of this page)



- (5) Nose Indexer: Yes No
- 6 Quackenbush Tool Model No.

NOTE: • Important— If chip escape reliefs are required on the sensing sleeve, they must be specified when ordering. A drawing must be provided showing the exact location and type openings required.
• Some applications involving long cutters require that the tips of the cutter extend beyond the Dwell and Depth Attachment when the spindle is fully retracted.





FOR OTHER CUTTER STYLES, FURNISH CUTTER DRAWING

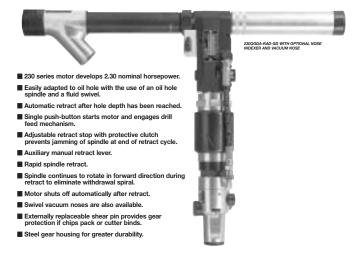
Right Angle Tools Right Angle Tools

QUACKENBUSH

230QGDA-RAD-GD Gun Drill Series

Capacity: Aluminum – .75" (19.1mm)

Stroke: Min. – .125" (3.2mm) Max. – Unlimited

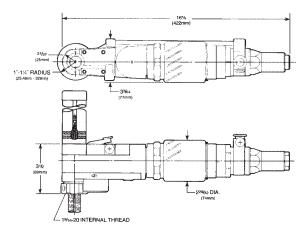


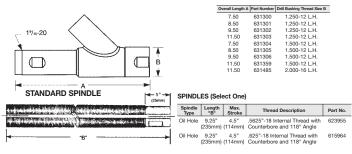
Model	Motor	Maximu	n Stroke	Wei	ght*	Maximu	m Length		Feed Per			Inlet	Minimum
	Configuration	in.	mm	lbs	kg	in.	mm	Speeds	Revolution		Hose Size		
230QGDA-RAD-GD	Right Angle	No I	imit	13.25	5.95	15 7/8	403.23	1500, 1850, 2100	.0005, .001	.5" NPT	.5"		

"Weight is tool without spindle and nose piece.
Rated tool performance at 90 PSIG measured at tool inlet with motor running.
When selecting speeds and feeds, see page 1-5.
Milet lightcator (R31 998) may be preferred.

2-18

SEE PAGES I-11-I-13 FOR SAFETY PRECAUTIONS. SEE PAGE 2-20 - 2-23 FOR TOOLING ACCESSORIES.

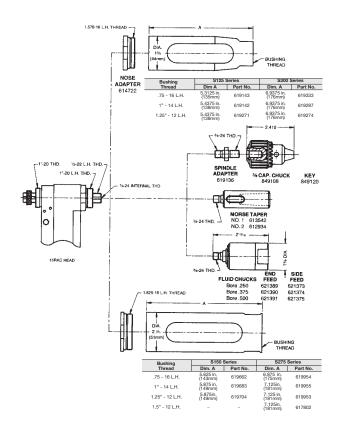


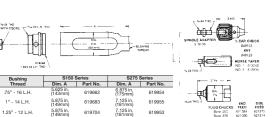


- Nose Indexer 1.5625"-20 (381326)
 Fluid Swivels used with oil hole spindles and selection of Fluid Chucks. (See page 2-23)
 Other Noses and Spindles are available at extra charge. (See page 2-24)

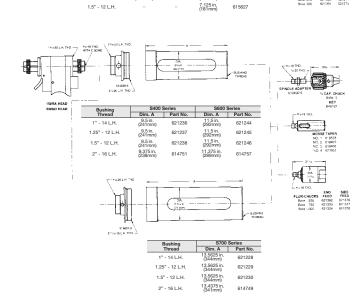
2-20

Accessories for the No. 15 Series Right Angle Drill

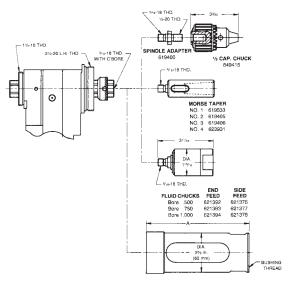




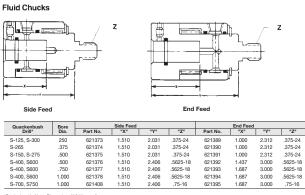
Accessories for the No. 158 and 230GD Series Right Angle Drills



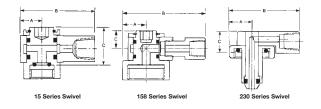
Accessories for the No. 230 B & RA Series Right Angle Drills



Bushina	S400	Series	S600 Series		
Thread	Dim. A	Part No.	Dim. A	Part No.	
1" - 14 L.H.	9.5 in. (241mm)	661236	11.5 in. (292mm)	621244	
1.25" - 12 L.H.	9.5 in. (241mm)	621237	11.5 in. (292mm)	621245	
1.5" - 12 L.H.	9.5 in. (241mm)	621238	11.5 in. (292mm)	621246	
07 40 1 11	9.375 in	C147E1	11 375 in	014757	



*Stroke length, Note: Dimensions X & Y are reference

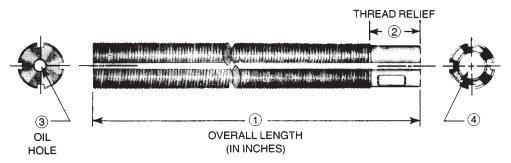


Quackenbush Drill	Model	Part No.	Α	В	С
15 QDA-RA-SU	ALL MODELS	631256	.4375	1.5	.7813
158QGDA-RA-SU	18 TPI SPINDLES	621448	.625	1.5	.8125
230QGDA-RA-SU-MS	12.5 TPI SPINDLES	381213	1.5625	1.75	.5

2-23 2-22

Right Angle Tools Accessories

How to order Spindles for Right Angle Tools

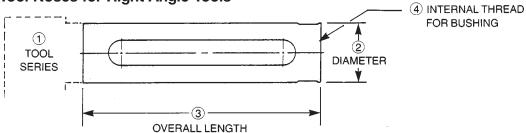


INFORMATION REQUIRED TO ORDER SPINDLES:

		D TO ONDER OF INDEES.
① OVERALL LENGTH:		
Stroke	_ + 2.87" (73mm) for 15QDA-RA =	Overall Length
Stroke	_ + 3.50" (89mm) for 140QGDA-RA-SU-	MS = Overall Length
Stroke	_ + 3.75" (95mm) for 158QGDA-RA =	Overall Length
Stroke	_ + 4.93" (125mm) for 230QGDA-RA-MS	S = Overall Length
Stroke	_ + 4.75" (121mm) for 230QGDA-RA-GD	D = Overall Length
Stroke	_ + 4.93" (125mm) for 230QGDAB-MS =	: Overall Length
② STANDARD SPINDLE	THREAD RELIEF	④ END PREPARATION OF SPINDLE:
.875" for 15QI	DA-RA and 140QGDA-RA	☐ INTERNAL THREAD:
1" for 158QDA	A-RA	(Provide drawing specifying thread, depth, angle and
(.5625" flange	width for 230QGDA-RA-MS)	counterbore depth if required)
1" for 230QDA	A-RA-GD	☐ STRAIGHT BORE:
NOTE: Specify	y if Thread Relief is other than standard.	Bore Diameter inches
		Depth inches
3 OIL HOLE REQUIRED	0? ☐ Yes ☐ No	☐ INTERNAL MORSE TAPER (for 158 and 230 Models only)
		No. 1 Morse Taper □
NOTE: Spindle quards ar	e highly recommended and are	No. 2 Morse Taper □

How to order Tool Noses for Right Angle Tools

available for all spindles. Please specify when ordering.



INFORMATION REQUIRED TO ORDER TOOL NOSES:

① TOOL SERIES

□ 15QDA-RA (1"-20 Nose Thread)
□ 158QGDA-RA (1.5625"-20 OR 2.25"-20 Nose Thread)
□ 230QGDA-RA-MS (1.5625"-20 OR 2.25"-20 Nose Thread)
□ 230QGDA-RA-GD (1.5625"-20 OR 2.25"-20 Nose Thread)
② DIAMETER

Standard Sizes - 1.1875" OD 15QDA-RA - 1.5625", 2" and 2.375" OD 230QGDA-RA-MS - 1.5625", 2" and 2.375" OD 230QGDA-RA-GD - 1.56256", 2" and 2.375" OD

③ OVERALL LENGTH

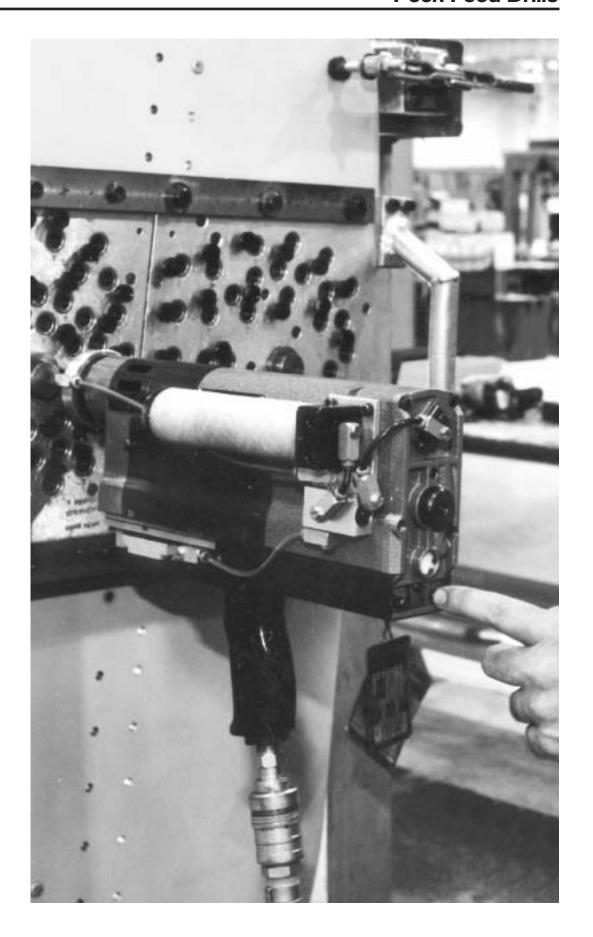
4 DRILL BUSHING SERIES

DRILL BUSHING

BUSHING SERIES	QUACKENBUSH NOSE THREAD (ID)
21000	.75" - 16
22000	1" - 14
23000	1.25" - 12
24000	1.5" - 12
25000	2" - 16

Bushings are not furnished with Quackenbush Tools.

NOTE: Drawings for special tool noses must be provided when ordering.



Introduction

Peck Feed Drills

Our peck feed drills are a unique category unto themselves. These drills drill a short distance, then retract from the hole to clear the chips and dissipate heat, and then return to the hole and drill again, and repeat this in-and-out motion until the process is fleighted. This peckles metion the other had better the control of the control of the process.

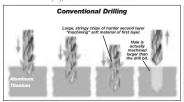
finished. This pecking motion gives the drill its name.
This is a unique advantage in the drilling of deep close-tolerance holes, especially in stacks of dissimilar materials.

With conventional drilling, drilling through aluminum into materials such as titanium extracts chips of the titanium out of the hole, which scratches the softer aluminum and deteriorates the hole quality. But by using the interrupted stroke of the peck drill, the chips are smaller and are far less likely to create problems.

This also reduces heat considerably, because the drill is not in the hole continuously, building up heat. Each time the drill retracts from the hole, it helps to dissipate heat, significantly reducing distortion and metall writed channe in the material.

metallurgical change in the material.

Because of their heat reduction capabilities, our peck drills have also been found to be highly productive in manufacturing environments that do not allow any type of lubrication or coolant.



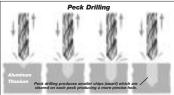


Equal Drill Time

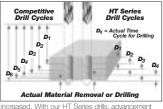
Our HT Series Peck Feed Drills define state of the art in one shot, close tolerance hole drilling with portable tools.

portatile tools.

During each peck, the peck timer circuit on competitive models combines the time to rapid advance, drill and retract. As you can see in the accompanying illustration, actual drill time is progressively reduced as the hole depth is







increased. With our HT Series drills, advancement and retraction times are separated from actual drill time, therefore the drill time is the same on each peck. The net result is increased performance.

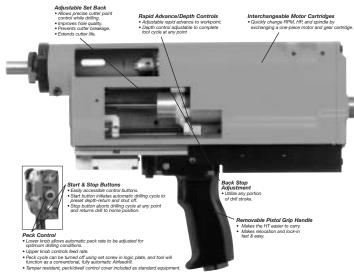
Drill Capacities

Peck drilling allows much larger diameter holes to be drilled than conventional drilling with respect to motor horsepower. Maximum diameter capacity will depend on drill chosen, material to be drilled, and cutter geometry. The adjoining chart shows capacities of our HT Series drills.

Drill Capacities of the HT Series Peck Feed Drills

Series	HP	Aluminum	Titanium	Steel
HT3	1.1	1.3	1.0	1.0
HT4	0.7	0.5	0.4	0.4

HT Series Peck Feed Drill Performance Features & Benefits



Peck Drills Peck Drills

QUACKENBUSH

HT3 Series

Capacity: Aluminum – 1.25" Titanium – 1" Steel – 1"

- 1.10 Horsepower
- Adjustable, controlled feed rate
- Adjustable peck rate, depth control, and rapid advance
- Equal Drill Time
- 4" Stroke
- One button start, fully automatic cycle
- Push button peck disable for non-peck advance at any time during the drilling cycle

- Reduces cost per hole
- Uses low cost cutters to produce high quality holes in dissimilar materials
- Eliminates most reaming operations
- Drills materials dry while maintaining acceptable hole quality and long cutter life.
- Remote start
- Rapid retract and re-entry minimizes cycle time
- Adjustable length nosepieces to fit cutter length
- Optional drill point lubricator to optimize hole quality



Model	Spindle	Speed Code	Function	Stroke
нт3	B - 5°-20 Male Thread, Jacobs Chuck C - 375°-24 Female Thread D - 5625°-18 Female Thread E75°-16 Female Thread	120 - 12400 RPM 030 - 3000 RPM 021 - 2100 RPM 016 - 1600 RPM 007 - 650 RPM 003 - 475 RPM 003 - 300 RPM 002 - 150 RPM 001 - 80 RPM	E - Equal Drill Time	40 - 4"

DRILL CAPACITIES:
Peck drilling allows much larger diameter holes to
be drilled than conventional drilling with respect to
motor horsepower. Maximum diameter capacity
will depend on drill chosen, material, and cutter
geometry.

SPECIFICATIONS: Recommended Air Pr Air Inlet Size: Thrust @ 90 PSIG

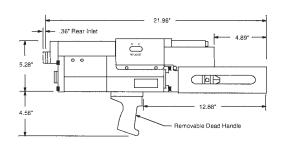
STANDARD EQUIPMENT
Removable dead handle
Hydraulic feed control
Adjustable and back control

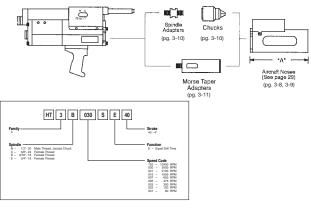
EXTRA COST ACCESSORIES (See pages 3-8 – 3-12) Fluid inducer Nosepieces (Fixed or Adjustab Drill Point Lubricator

cost per hole

Refer to pages 12 and 13 for Taper-Lok fixturing Refer to pages 3-8 thru 3-12 for HT3 Series accessories.

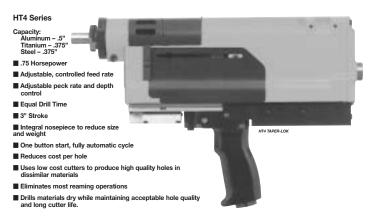
HT3 Series Dimensional Data & Accessories





Peck Drills Peck Drills

QUACKENBUSH



Model	Spindle	Speed Code	Function	Stroke	Mountin Single/Dbl. Gear	ng Adapter Triple/Diff. Gear	Chuck	Handle
Male Thread, 110 – 11000 RF T - #1 Jacobs 057 – 5700 RF Taper** 029 – 2900 RPI 015 – 1500 RPI 008 – 780 RPI 005 – 500 RPI 005 – 270 RPI		008 - 780 RPM 005 - 500 RPM 003 - 270 RPM*	E - Equal Drill Time	30 - 3"	A – 21000 Series B – 22000 Series C – 23000 Series D – 24000 Series	E - 21000 Series F - 22000 Series G - 23000 Series H - 24000 Series K - Concentric Collet‡	A375" Capacity B - 025" Capacity #1 Jacobs Tape X - No Chuck F - Fluid Inducing	P - Pistol
Triple or differential gearing "2000 RPM tool must be ordered with spindle "and chuck*B'. "T spindle available only with Speed Code 220. DRILL CAPACITIES: DRILL CAPACITIES: DRILL CAPACITIES: On the Code 200. White Code 200. DRILL CAPACITIES:			SPECIFICATIONS: Recommended Air Pre Air Inlet Size: Thrust @ 90 PSIG Weight: STANDARD EQUIPMENT Pistol Grip Handle Hydraulic feed control	r	90 PSIG 375" N.P.T. 500 lbs. 11.5 lbs.	to assure full 3" s mounting adapte occur using stand	ize and cutter diamete	proper imum will

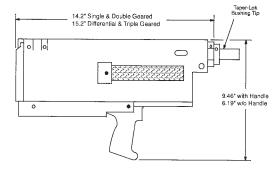
HT4 Series Dimensional Data & Accessories

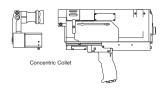
Refer to pages 14 and 15 for Concentric Collet details. When Ordering, specify:

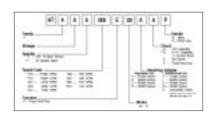
1. Complete model number from page 3-6.

2. Concentric Collet code number from chart on page 11.

3. Cutter guide diameter.







3-7 3-6

Peck Drills Peck Drills

QUACKENBUSH

120QP-21500 Self Feed Drill

Capacity* (Diameter):
Aluminum – .20" (5mm) Hole
.38" (10mm) Countersink

Precision power feed drilling
High speed, precision spindle - no burrs
Use with simple templates with required
hole locations

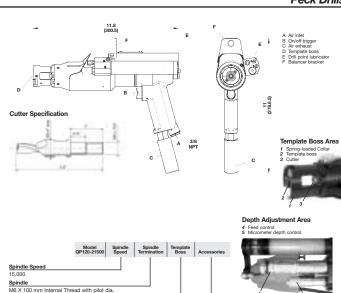
■ Sealed hydraulic feedrate control, infinitely adjustable with micrometer depth control

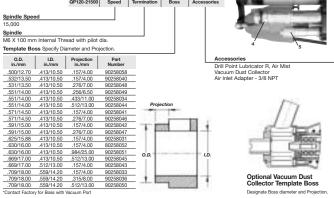
■ Spring-loaded collar to assure hole perpendicularity

Optional:
Drill point lubricator for improved hole quality Vacuum dust collection port for composite materials Recoules premium-quality cutters**

- "C" Foot Clamping contact Sales Manager or Factory
- Concentric Collet Clamping contact Sales Manager or Factory







SPECIFICATIONS: Air Inlet = 3/8 NPT Power = 1.2 HP (0.9 KW) Thrust = 55 lbs. (25daN) Weight = 5.8 lb. (2.62 Kg) Air Consumption = 40 CFM (1100 L/Min) Stroke = 1.0 inch (25 mm) Depth Repeatability = .001 inch (0.025 mm) Noise = 80 dBA At all times verify that guards are in place and secure. Operators must understand and follow Safety Practices.

3-8 3-9 Peck Drills Peck Drills

QUACKENBUSH

120QP-21501 Self Feed Drill with Vacuum Clamping

Capacity (Diameter):

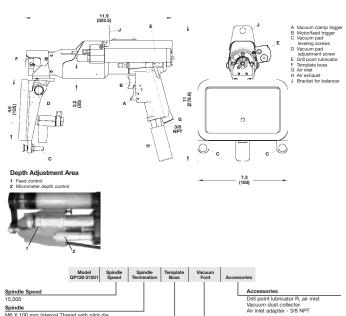
*Aluminum – .20" (5mm) Hole
.38" (10mm) Countersink

- Precision power feed drilling
 High speed, super precision spindle no burrs between materials
 Use with simple template with required
 hole locations
- Clamps to workpiece with leveling vacuum pad
 Custom made vacuum pad to suit application
 No obstructions or holes (voids) permitted in
 clamping area
- Sealed hydraulic feedrate control, infinitely adjustable with micrometer depth control
- Dual Triggers: Lower trigger actuates vacuum clamp Upper trigger actuates motor and feed
- Optional

 Drill point lubricator improves hole quality
 Recoules premium-quality cutters**

*Not to be used for titanium or steel
**Order separately. With Recoules cutter, hole tolerance of 30 microns (.0012)
can be achieved.





		QP120-21301	Speed	rermination B	088	POOL ACCESSORES
Spindle Spe	ed					Accessories
15,000						Drill point lubricator R, air mist
Spindle						Vacuum dust collector Air inlet adapter - 3/8 NPT
		ead with pilot				Vacuum Clamping Foot
Template Bos	s Specify Diar	meter and Proje	ction			Illustration = 4.9 x 7.3 in. (125 x 185 mm)
O.D. in./mm	I.D. in./mm	Projection in./mm	Part Number			Spindle to front edge of Pad = 2.4 in. (62mm Vacuum clamping foot is normally custom designed to suit particular application
BOSS DIAME	TER					designed to suit particular application
.531/13.50	.413/10.50	.276/7.00	90258048			
.571/14.50	.413/10.50	.276/7.00	90258046			
.591/15.00	413/10.50	.276/7.00	90258047			

Vacuum Clamping Foot

A flexible seal around periphery of pad allows for some variation in contour. Vacuum pad adjustment and levelling screws set cutter centerline perpendicular to work surface.

to work surface.

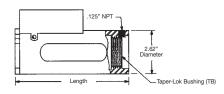
Area of pad must be minimum of 30 square inches (200 square centimeters).

Contact local Sales Manager or Factory for assistance.

SPECIFICATIONS: Air Consumption = 40 CPM (1100 L/Min) At all times verify that quards are in place and Air intel = 30 RM or Stroke = 1.0 inch (25 mm) Secure Operators must understand and follow Secu

Fixed Aircraft Nosepieces for HT1, HT2 and HT3

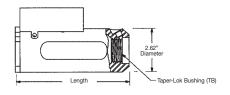
Nosepiece part number includes Guard and F571 (.125") NPT) Plug



Part No.	Type	Stroke	Length	Guard	TB Series	Tool Mount
537259	Fluid Inducer (Alum.)	1.5"	6.97	537581	22000	HT2
537260	Fluid Inducer (Alum.)	1.5"	6.97	537581	23000	HT2
537261	Fluid Inducer (Alum.)	1.5"	6.97	537581	24000	HT2
537258	Fluid Inducer (Alum.)	1.5"	6.84	537581	25000	HT2
537131	Fluid Inducer (Alum.)	4"	10.16	537580	22000	HT1, HT3
537132	Fluid Inducer (Alum.)	4"	10.16	537580	23000	HT1, HT3
537133	Fluid Inducer (Alum.)	4"	10.16	537580	24000	HT1, HT3
537130	Fluid Inducer (Alum.)	4"	10.03	537580	25000	HT1, HT3
539522	Fluid Inducer (Steel)	1.5"	6.97	537581	22000	HT2
539523	Fluid Inducer (Steel)	1.5"	6.97	537581	23000	HT2
539524	Fluid Inducer (Steel)	1.5"	6.97	537581	24000	HT2
539525	Fluid Inducer (Steel)	1.5"	6.84	537581	25000	HT2
539622	Fluid Inducer (Steel)	4"	10.16	537580	22000	HT1, HT3
539623	Fluid Inducer (Steel)	4"	10.16	537580	23000	HT1, HT3
539624	Fluid Inducer (Steel)	4"	10.16	537580	24000	HT1, HT3
539625	Fluid Inducer (Steel)	4"	10.03	537580	25000	HT1, HT3

Tapered Nosepieces

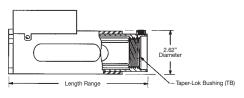
Nosepiece part number includes Guard



Part No.	Type	Stroke	Length	Guard	TB Series	Tool Mount
540240	Fluid Inducer (Alum.)	1.5"	6.84	537581	22000	HT2
540241	Fluid Inducer (Alum.)	1.5"	6.84	537581	23000	HT2
540242	Fluid Inducer (Alum.)	1.5"	6.84	537581	24000	HT2
540243	Fluid Inducer (Steel)	4"	10.03	537580	22000	HT1, HT3
540244	Fluid Inducer (Steel)	4"	10.03	537580	23000	HT1, HT3
5/02/5	Eluid Indusor (Stool)	4"	10.03	E27E90	24000	LITH LITE

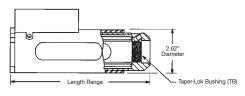
Adjustable Nosepieces for HT1, HT2 and HT3

Position of Bushing Tip can be precisely adjusted to drill length, eliminate drilling "Air".



Part No.	Туре	Stroke	Length Range	Guard	TB Series	Tool Mount
537373	Adjustable (Alum.)	3"	7.5 - 9.9	537581	22000	HT2
537374	Adjustable (Alum.)	3"	7.5 - 9.9	537581	23000	HT2
537375	Adjustable (Alum.)	3"	7.5 - 9.9	537581	24000	HT2
537376	Adjustable (Alum.)	3"	7.5 - 9.9	537581	25000	HT2
537134	Adjustable (Alum.)	4"	10.0 - 12.6	537580	22000	HT1, HT3
537135	Adjustable (Alum.)	4"	10.0 - 12.6	537580	23000	HT1, HT3
537136	Adjustable (Alum.)	4"	10.0 - 12.6	537580	24000	HT1, HT3
537142	Adjustable (Alum.)	4"	10.0 - 12.6	537580	25000	HT1, HT3
539007	Adjustable (Steel)	3"	7.5 - 9.8	537581	22000	HT2
539008	Adjustable (Steel)	3"	7.5 - 9.8	537581	23000	HT2
539009	Adjustable (Steel)	3"	7.5 - 9.8	537581	24000	HT2
539010	Adjustable (Steel)	3"	7.5 - 9.8	537581	25000	HT2
537583	Adjustable (Steel)	4"	10.0 - 12.4	537580	22000	HT1, HT3
537584	Adjustable (Steel)	4"	10.0 - 12.4	537580	23000	HT1, HT3
537585	Adjustable (Steel)	4"	10.0 - 12.4	537580	24000	HT1, HT3
537586	Adjustable (Steel)	4"	10.0 - 12.4	537580	25000	HT1, HT3

Tapered Adjustable Nosepieces



Part No.	Type	Stroke	Length Range	Guard	TB Series	Tool Mount
540246	Adjustable (Steel)	3"	7.5 - 9.8	537581	22000	HT2
540247	Adjustable (Steel)	3"	7.5 - 9.8	537581	23000	HT2
540248	Adjustable (Steel)	3"	7.5 - 9.8	537581	24000	HT2
540249	Adjustable (Steel)	4"	10.0 - 12.4	537580	22000	HT1, HT3
540250	Adjustable (Steel)	4"	10.0 - 12.4	537580	23000	HT1, HT3
540251	Adjustable (Steel)	4"	10.0 - 12.4	537580	24000	HT1, HT3

Peck Drills Accessories

HT3/HT4 Concentric Collet Attachment

Add to existing tool, order:

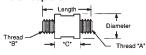
P/N CC-HT13 (for colleting sizes to 1" - HT3)
P/N CC-HT13M (for colleting sizes > 1" - HT3)
P/N CC-HT4 (for colleting sizes to 1" - HT4)
P/N CC-HT4M (for colleting sizes > 1" - HT4)

Specify:

Concentric Collet Code number (Chart on Page 4-6)
 Cutter or Countersink Guide Diameter



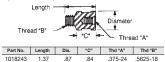
Spindle Adapters



Part No.	Length	Dia.	"C"	Thd "A"	Thd "B"
1017808	2.15	.99	.99	.5625-18	.5-20
1018859	2.19	.62	1.43	.3125-24	.375-24
1018245	2.20	.99	.99	.375-24	.5625-18
1019072	2.92	1.12	.99	.7031-16	.375-16
1019506	1.44	.86	.25	.5-20	.5625-18
1110029	1.44	.86	.25	.375-24	.5625-18
1110112	1.87	.62	1.12	.375-24	.375-24
539011	1.14	.75	.25	.375-24	.5-20
539012	1.39	.88	.25	.5625-18	.5-20
539023	1.39	.75	.25	.375-24	.375-24

Spindle Adapters

3-14

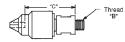


Jacobs Chucks

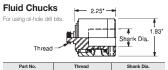


Part No.	Mount	Capacity	"A"	"B"	"C"	ı
1005953	#OJT	.1563	1.09	0.85	0.59	
1005078	.375"-24	.25	1.56	1.117	0.93	
1001505	.375"-24	.25 HD	1.71	1.29	1.02	
1004422	.375"-24	.375	2.16	1.67	1.09	
1001252	.375"-24	.375	1.93	1.42	1.09	
1009726	.375"-24	.5	2.42	1.79	1.28	
1005398	.5"-20	.25	1.75	1.32	1.08	
1005000	.5"-20	.375	1.93	1.42	1.13	
1005020	.5"-20	.375	2.31	1.79	1.36	
1000434	.5"-20	.5	2.42	1.79	1.28	

Chuck Assemblies



Assembly	Chuck	Adapter	"C"	Thd "B"
1025422	1001252	1018859	2.52	.3125-24
1025591	1001252	1110112	2.21	.375-24
1025427	1004422	1018245	2.08	.5625-18
1025473	1004422	1110029	1.34	.5625-18
1025301	1000434	1017808	2.27	.5-20
1025308	1000434	1019506	1.53	.5625-18



1018219	.5625"-18	1.00
1018220	.5625"-18	0.75
1018221	.375"-24	0.50

HT4 Mounting Adapters



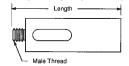
Lube Port		v	vith Lubrica	ition Port	
	Part No.	Part No.	Dim "A"	Part No.	Dim "A"
	1110276	1110865	1.42"	1110450	2.06"
	1110277	1110866	1.42"	1110417	2.06"
	1110278	1110867	1.42"	1110451	2.06"
	1110279	1110868	1.42"	1110453	2.06"

Reducer Bushings (for Taper-Lok)



	"A"	"B"	"C"	TI TI	В
Part No.	"A"	"B"	"C"	From	То
1110695	1"-14	.75"-16	1.38	22000	21000
1110700	1.5"-12	1.25"-12	1.94	24000	23000
1110699	1.5"-12	1"-14	1.93	24000	22000
1110696	1.25"-12	.75"-16	1.63	23000	21000
1110698	1.5"-12	.75"-16	1.94	24000	21000
1110697	1.25"-12	1"-14	1.63	23000	22000
1110701	2"-16	1.5"-12	2.50	25000	24000
537505	2"-16	1"-14	2.62	25000	22000
537506	2"-16	1.25"-12	2.62	25000	23000
537507	2"-16	1.5"-12	2.62	25000	24000

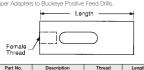
Morse Taper Adapter (Male Thd)



Part No.	Description	Thread	Length	
1018117	#2 Morse Taper	.5625"-18	3.25"	
1013853	#2 Morse Taper	.5625"-18	5.37"	
1019070	#2 Morse Taper	.75"-16	5.50"	
1013854	#3 Morse Taper	.5625"-18	5.93"	
1010071	#2 Morgo Tapor	75" 16	6 06"	

Morse Taper Adapter (Female Thd)

A Spindle Adapter is required to attach female thread Morse Taper Adapters to Buckeye Positive Feed Drills.



Part No.	Description	Thread	Length
529279	#1 Morse Taper	1/2"-20	3.69"
527989	#2 Morse Taper	1/2"-20	4.12"

Series 200 **Collet Assemblies**



Part No.	Collet	Mounting Thd.
1025509	1/8"	3/8"-24
1025510	3/16"	3/8"-24
1025511	1/4"	3/8"-24
1025512	5/16"	3/8"-24
1025513	3/8"	3/8"-24
Note: Collet assem	bly includes speci	fied collet.

Series 200 Collets

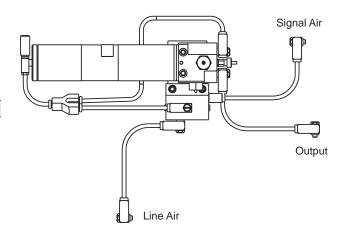
D 111	Size				
Part No.	inches	mm			
204	.125"	3.175			
46-500-141	.1406"	3.571			
205	.1563"	3.962			
46-500-172	.1719"	4.369			
206	.1875"	4.762			
46-500-203	.2031"	5.159			
207	.2188"	5.563			
46-500-234	.2344"	5.944			
208	.25"	6.350			
46-500-265	.2656"	6.731			
209	.2813"	7.137			
46-500-297	.2969"	7.544			
210	.3125"	7.950			
46-500-328	.3281"	8.331			
211	.3438"	8.738			
46-500-359	.3594"	9.119			
212	.375"	9.525			
46-500-390	.3906"	9.906			

210 46-500-328 211 46-500-359 212 46-500-390 .3438" .3594" .375" .3906" Add "C" to the part number for use with Thru-the-Spindle Coolant. Slots are filled with elastomer.

Drill Point Lubricator

Utilizes PL-5 with special mounting bracket and shuttle valve.

Series	Fluid Oz. Capacity	Part Number
HT1/2/3	3.0	1026059
HT1/2/3	5.0	1026034
HT4	3.0	1026033
HT4	5.0	1026058



Dwell Kit: 1025833 - HT1, HT2, & HT3 Series

Provides adjustable time at end of drilling stroke before automatic retraction.

HT4 Series Vacuum Pickup Attachment: 1025928

Remove chuck cover and mount over "window". Has a port for 1.45" I.D. tubing.

Cooper Power Tools P.O. Box 1410 Lexington, SC 29071-1410 USA

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5925 McLaughlin Road Mississauga, Ontario Canada L5R 1B8 Phone: (905) 501-4785 Fax: (905) 501-4786

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Introduction

Operation

Self Colleting Tools

Our self colleting drills provide rapid cycle times while producing quality holes and accurate countersinks. With stroke capacity from 1 inch to 3 inches, power capacity from 0.85 hp to 2.0 hp, and a full range of speeds, these self colleting tools are ideal for drilling and countersinking aircraft skin. Aluminum, laminates, and mixed stacks of aluminum or laminate over titanium or steel are well suited to the superb hole making capacity of these machines.

and simplifies the fixturing required to mont and locate these tools.

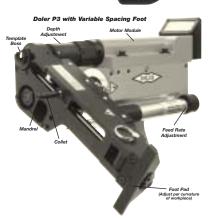
these tools.

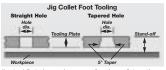
In the case of the variable spacing foot (also known as the template foot), the collet/mandrel is inserted into a predetermined hole in the workpiece. The template

Release the trigger; the mo unclamping occurs. 6.Reposition the Boss and drill other holes within the colleting Range. 2.Drill the first hole by conventional means.
Template Boss in the drilling template. Insure that the Collet/Mandrell extends through the workpiece.

The drill/countersink cycle is automated, maximizing productivity with single trigger control. Each of these tools uses a variation of an expanding collet to clamp or fixture in a tooling plate or to clamp directly to he workpiece. This economizes

boss is inserted into a template hole with the boss face on the workpiece. When the trigger is actuated,





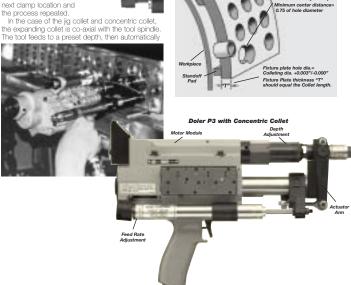
the tool first clamps by expanding the collet on the mandrel. The tool automatically feeds to a preset depth, and then

automatically retracts.
After retracting, the tool unclamps. Remaining in the same teamping location, the tool can then be moved to the next clamp location and the process repeated.



retracts. After retracting, the tool unclamps. The tool is then moved to the next

Concentric Collet Foot



4-3 4-2

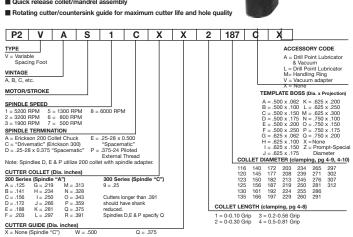
4-5

Dimensional Data - P2 Drill with Variable Spacing Foot

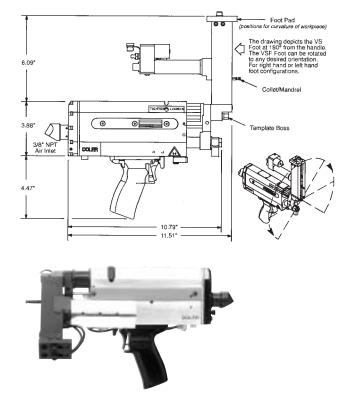


P2 Drill with Variable Spacing Foot

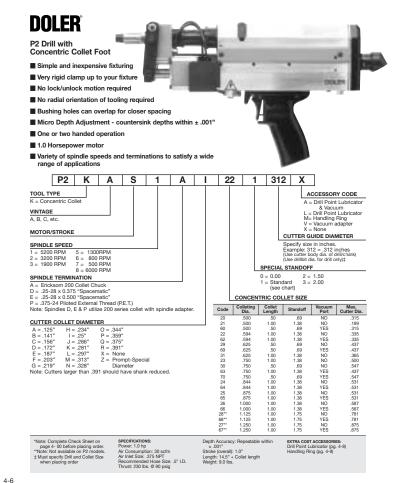
- Light and compact yet rigid and rugged
- Modular design for easy setup and servicing
- Variety of spindle speeds and terminations to satisfy a wide range of applications
- Collet/Mandrel slides easily very smooth operation
- Micro Depth Adjustment -countersink depths within ± .001"
- Infinitely adjustable feed rate
- 1.0 Horsepower motor
- Adjustable foot pad for vertical holes regardless of surface curvature
- Variable Spacing Foot can be oriented in any position. No need for separate left and right hand versions.
- Quick release collet/mandrel assembly

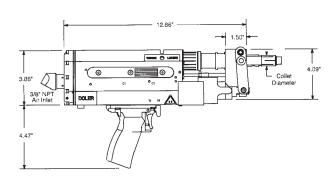


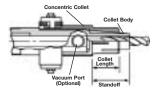
Weight: 9.7 lbs. Hole Spacing Range: 0.74" to 3.0" (colleting hole to drilled hole) Collet/Mandrel Stroke: 0.50"-Material thickness variation











Standoff is the distance between the Concentric Collet shoulder and the end of the Collet body.

The holes in the Fixture Plate should be the nominal Collet diameter + .003, -.000.

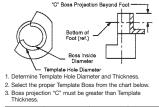
When using Vacuum Collection, the Concentric Collet is moved outboard by .75° A. 50° diameter vacuum collector port is provided in front of the Foot. A separate vacuum system can be attached to the vacuum port.

Refer to pages 14 and 15 for Concentric Collet tooling and operation.

Doler P2 Collets and Mandrels

DOLER®

Template Boss



THIORIESS.	THICKIESS.			
Template Hole Dia.	Boss Projection "C"	Boss I.D.	Boss Part No.	
.500	.062	.39	44-101-203	
.500	.100	.39	44-101-212	
.500	.150	.39	44-101-215	
.500	.175	.39	44-101-255	
.500	.200	.39	44-101-252	
.500	.250	.39	44-101-261	
.625	.062	.51	44-101-202	
.625	.100	.51	44-101-211	
.625	.150	.51	44-101-214	
.625	.175	.51	44-101-223	
.625	.200	.51	44-101-218	
.625	.250	.51	44-101-260	
.625	.300	.51	44-101-262	
.750	.100	.64	44-101-210	
.750	.150	.64	44-101-213	
.750	.175	.64	44-101-282	
.750	.200	.64	44-101-219	

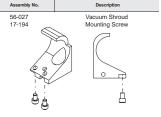
P2 Drill Point Lubricator



The Drill Point Lubricator provides lubricated air to the point of the cutter. The Doler PL Lubricator is mounted on the side of the P2 Main Module. The Drill Point Lubricator has a quick disconnect fitting for rapid no-mess refilling; use 80-503 Wall Tank to refill for it can be is filled manually and requires no additional equipment. Refer to page 16.

Assembly No.	Description
85-043	For P2 Variable Spacing Foot Models
85-050	For P2 Concentric Collet Models
Note: Assembly number is the	complete assembly including P2 mounting hardware.

Vacuum Pickup Attachment



Collets and Mandrels

Standard Duty (Used in Doler P2 Variable Spacing Foot Drill)



Grip Range*	Length Code**	Base Collet Number	Collet Overall Length	Base Mandrel Number	Mandrel Overall Length
0 - 0.10	- 23	46-051-xxx	1.15	46-151-xxx	2.25
0 - 0.30	- 40	46-052-xxx	1.40	46-152-xxx	2.50
0.20 - 0.56	- 63	46-053-xxx	1.65	46-153-xxx	2.75
0.45 - 0.81	- 90	46-054-xxx	1.92	46-154-xxx	3.00

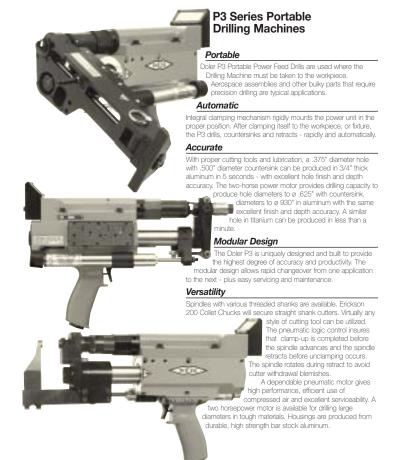
Min. Hole Size	Max. Hole Size	Collet Code	Collet Number	Mandrel Number	Min. Hole Size	Max. Hole Size	Collet Code	Collet Number	Mandrel Number
Collets an	d Mandrels	s			Collets ar	nd Mandrel	s		
0.1160	0.1210	.1160-23	46-051-116	46-151-120	0.1600	0.1670	.1614-23	46-051-161	46-151-156
0.1160	0.1210	.1160-40	46-052-116	46-152-120	0.1600	0.1670	.1614-40	46-052-161	46-152-156
0.1160	0.1210	.1160-63	46-053-116	46-153-120	0.1600	0.1670	.1614-63	46-053-161	46-153-156
0.1160	0.1210	.1160-90	46-054-116	46-154-120	0.1600	0.1670	.1614-90	46-054-161	46-154-156
0.1200	0.1250	.1200-23	46-051-120	46-151-120	0.1655	0.1735	.1667-23	46-051-166	46-151-172
0.1200	0.1250	.1200-40	46-052-120	46-152-120	0.1655	0.1735	.1667-40	46-052-166	46-152-172
0.1200	0.1250	.1200-63	46-053-120	46-153-120	0.1655	0.1735	.1667-63	46-053-166	46-153-172
0.1200	0.1250	.1200-90	46-054-120	46-154-120	0.1655	0.1735	.1667-90	46-054-166	46-154-172
0.1230	0.1280	.1230-23	46-051-123	46-151-125	0.1710	0.1790	.1719-23	46-051-172	46-151-172
0.1230	0.1280	.1230-40	46-052-123	46-152-125	0.1710	0.1790	.1719-40	46-052-172	46-152-172
0.1230	0.1280	.1230-63	46-053-123	46-153-125	0.1710	0.1790	.1719-63	46-053-172	46-153-172
0.1230	0.1280	.1230-90	46-054-123	46-154-125	0.1710	0.1790	.1719-90	46-054-172	46-154-172
0.1250	0.1300	.1250-23	46-051-125	46-151-125	0.1765	0.1845	.1771-23	46-051-177	46-151-172
0.1250	0.1300	.1250-40	46-052-125	46-152-125	0.1765	0.1845	.1771-40	46-052-177	46-152-172
0.1250	0.1300	.1250-63	46-053-125	46-153-125	0.1765	0.1845	.1771-63	46-053-177	46-153-172
0.1250	0.1300	.1250-90	46-054-125	46-154-125	0.1765	0.1845	.1771-90	46-054-177	46-154-172
0.1300	0.1350	.1300-23	46-051-130	46-151-125	0.1815	0.1895	.1823-23	46-051-182	46-151-187
0.1300	0.1350	.1300-40	46-052-130	46-152-125	0.1815	0.1895	.1823-40	46-052-182	46-152-187
0.1300	0.1350	.1300-63	46-053-130	46-153-125	0.1815	0.1895	.1823-63	46-053-182	46-153-187
0.1300	0.1350	.1300-90	46-054-130	46-154-125	0.1815	0.1895	.1823-90	46-054-182	46-154-187
0.1350	0.1400	.1358-23	46-051-135	46-151-140	0.1865	0.1945	.1875-23	46-051-187	46-151-187
0.1350	0.1400	.1358-40	46-052-135	46-152-140	0.1865	0.1945	.1875-40	46-052-187	46-152-187
0.1350	0.1400	.1358-63	46-053-135	46-153-140	0.1865	0.1945	.1875-63	46-053-187	46-153-187
0.1350	0.1400	.1358-90	46-054-135	46-154-140	0.1865	0.1945	.1875-90	46-054-187	46-154-187
0.1400	0.1450	.1406-23	46-051-140	46-151-140	0.1915	0.1995	.1927-23	46-051-192	46-151-187
0.1400	0.1450	.1406-40	46-052-140	46-152-140	0.1915	0.1995	.1927-40	46-052-192	46-152-187
0.1400	0.1450	.1406-63	46-053-140	46-153-140	0.1915	0.1995	.1927-63	46-053-192	46-153-187
0.1400	0.1450	.1406-90	46-054-140	46-154-140	0.1915	0.1995	.1927-90	46-054-192	46-154-187
0.1450	0.1500	.1458-23	46-051-145	46-151-140	0.1970	0.2050	.1979-23	46-051-197	46-151-203
0.1450	0.1500	.1458-40	46-052-145	46-152-140	0.1970	0.2050	.1979-40	46-052-197	46-152-203
0.1450	0.1500	.1458-63	46-053-145	46-153-140	0.1970	0.2050	.1979-63	46-053-197	46-153-203
0.1450	0.1500	.1458-90	46-054-145	46-154-140	0.1970	0.2050	.1979-90	46-054-197	46-154-203
0.1500	0.1560	.1510-23	46-051-150	46-151-156	0.2025	0.2105	.2031-23	46-051-203	46-151-203
0.1500	0.1560	.1510-40	46-052-150	46-152-156	0.2025	0.2105	.2031-40	46-052-203	46-152-203
0.1500	0.1560	.1510-63	46-053-150	46-153-156	0.2025	0.2105	.2031-63	46-053-203	46-153-203
0.1500	0.1560	.1510-90	46-054-150	46-154-156	0.2025	0.2105	.2031-90	46-054-203	46-154-203
0.1550	0.1620	.1562-23	46-051-156	46-151-156	0.2075	0.2155	.2083-23	46-051-208	46-151-203
0.1550	0.1620	.1562-40	46-052-156	46-152-156	0.2075	0.2155	.2083-40	46-052-208	46-152-203
0.1550	0.1620	.1562-63	46-053-156	46-153-156	0.2075	0.2155	.2083-63	46-053-208	46-153-203
0.1550	0.1620	.1562-90	46-054-156	46-154-156	0.2075	0.2155	.2083-90	46-054-208	46-154-203

Continued on Page 4-10.

Doler P2 Collets and Mandrels

4-10

Min. Hole Size	Max. Hole Size	Collet Code	Collet Number	Mandrel Number	Min. Hole Size	Max. Hole Size	Collet Code	Collet Number	Mandrel Number
Collets ar	nd Mandrel	s			Collets ar	nd Mandrel	s		
0.2125	0.2205	.2135-23	46-051-213	46-151-219	0.2645	0.2725	.2656-23	46-051-265	46-151-265
0.2125	0.2205	.2135-40	46-052-213	46-152-219	0.2645	0.2725	.2656-40	46-052-265	46-152-265
0.2125	0.2205	.2135-63	46-053-213	46-153-219	0.2645	0.2725	.2656-63	46-053-265	46-153-265
0.2125	0.2205	.2135-90	46-054-213	46-154-219	0.2645	0.2725	.2656-90	46-054-265	46-154-265
0.2175	0.2255	.2188-23	46-051-219	46-151-219	0.2695	0.2775	.2708-23	46-051-271	46-151-265
0.2175	0.2255	.2188-40	46-052-219	46-152-219	0.2695	0.2775	.2708-40	46-052-271	46-152-265
0.2175	0.2255	.2188-63	46-053-219	46-153-219	0.2695	0.2775	.2708-63	46-053-271	46-153-265
0.2175	0.2255	.2188-90	46-054-219	46-154-219	0.2695	0.2775	.2708-90	46-054-271	46-154-265
0.2235	0.2315	.2240-23	46-051-224	46-151-219	0.2745	0.2825	.2760-23	46-051-276	46-151-281
0.2235	0.2315	.2240-40	46-052-224	46-152-219	0.2745	0.2825	.2760-40	46-052-276	46-152-281
0.2235	0.2315	.2240-63	46-053-224	46-153-219	0.2745	0.2825	.2760-63	46-053-276	46-153-281
0.2235	0.2315	.2240-90	46-054-224	46-154-219	0.2745	0.2825	.2760-90	46-054-276	46-154-281
0.2285	0.2365	.2292-23	46-051-229	46-151-234	0.2805	0.2885	.2812-23	46-051-281	46-151-281
0.2285	0.2365	.2292-40	46-052-229	46-152-234	0.2805	0.2885	.2812-40	46-052-281	46-152-281
0.2285	0.2365	.2292-63	46-053-229	46-153-234	0.2805	0.2885	.2812-63	46-053-281	46-153-281
0.2285	0.2365	.2292-90	46-054-229	46-154-234	0.2805	0.2885	.2812-90	46-054-281	46-154-281
0.2335	0.2415	.2344-23	46-051-234	46-151-234	0.2855	0.2935	.2864-23	46-051-286	46-151-281
0.2335	0.2415	.2344-40	46-052-234	46-152-234	0.2855	0.2935	.2864-40	46-052-286	46-152-281
0.2335	0.2415	.2344-63	46-053-234	46-153-234	0.2855	0.2935	.2864-63	46-053-286	46-153-281
0.2335	0.2415	.2344-90	46-054-234	46-154-234	0.2855	0.2935	.2864-90	46-054-286	46-154-281
0.2385	0.2465	.2396-23	46-051-239	46-151-234	0.2905	0.2985	.2916-23	46-051-291	46-151-297
0.2385	0.2465	.2396-40	46-052-239	46-152-234	0.2905	0.2985	.2916-40	46-052-291	46-152-297
0.2385	0.2465	.2396-63	46-053-239	46-153-234	0.2905	0.2985	.2916-63	46-053-291	46-153-297
0.2385	0.2465	.2396-90	46-054-239	46-154-234	0.2905	0.2985	.2916-90	46-054-291	46-154-297
0.2435	0.2515	.2448-23	46-051-245	46-151-250	0.2955	0.3035	.2969-23	46-051-297	46-151-297
0.2435	0.2515	.2448-40	46-052-245	46-152-250	0.2955	0.3035	.2969-40	46-052-297	46-152-297
0.2435	0.2515	.2448-63	46-053-245	46-153-250	0.2955	0.3035	.2969-63	46-053-297	46-153-297
0.2435	0.2515	.2448-90	46-054-245	46-154-250	0.2955	0.3035	.2969-90	46-054-297	46-154-297
0.2485	0.2565	.2500-23	46-051-250	46-151-250	0.3015	0.3095	.3021-23	46-051-302	46-151-297
0.2485	0.2565	.2500-40	46-052-250	46-152-250	0.3015	0.3095	.3021-40	46-052-302	46-152-297
0.2485	0.2565	.2500-63	46-053-250	46-153-250	0.3015	0.3095	.3021-63	46-053-302	46-153-297
0.2485	0.2565	.2500-90	46-054-250	46-154-250	0.3015	0.3095	.3021-90	46-054-302	46-154-297
0.2545	0.2625	.2552-23	46-051-255	46-151-250	0.3065	0.3145	.3043-23	46-051-307	46-151-312
0.2545	0.2625	.2552-40	46-052-255	46-152-250	0.3065	0.3145	.3043-40	46-052-307	46-152-312
0.2545	0.2625	.2552-63	46-053-255	46-153-250	0.3065	0.3145	.3043-63	46-053-307	46-153-312
0.2545	0.2625	.2552-90	46-054-255	46-154-250	0.3065	0.3145	.3043-90	46-054-307	46-154-312
0.2595	0.2675	.2604-23	46-051-260	46-151-265	0.3115	0.3195	.3125-23	46-051-312	46-151-312
0.2595	0.2675	.2604-40	46-052-260	46-152-265	0.3115	0.3195	.3125-40	46-052-312	46-152-312
0.2595	0.2675	.2604-63	46-053-260	46-153-265	0.3115	0.3195	.3125-63	46-053-312	46-153-312
0.2595	0.2675	.2604-90	46-054-260	46-154-265	0.3115	0.3195	.3125-90	46-054-312	46-154-312

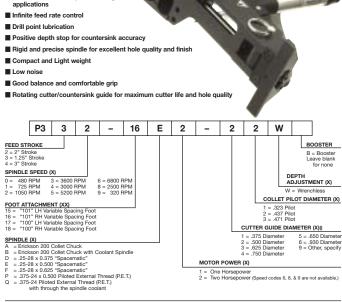


DOLER

P3 Drill with Variable Spacing Foot

Thrust and power to drill up to .750" diameter hole with a .930" countersink in aluminum or a .500" diameter hole with a .750" countersink in titanium.

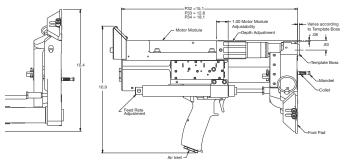
■ Variety of spindle speeds and terminations to satisfy a wide range of applications

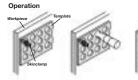


OPTIONAL EQUIPMENT (see Template Boss Clamping Collet/Mandrel Foot Pad Erickson 200 Collet EXTRA COST ACCESSORIES Drill Point Lubricator Handling Ring Venturi Vacuum Vacuum Vacuum Vacuum Vacuum Adapter *Note: Complete Check Sheet on page 4-00 before placing order. ‡ Must specify Drill and Collet size when placing order Thrust: 320 lbs. @ 80 psig; w/booster 575lbf. Depth Accuracy: Repeatable within .001" Weight: P32 - 14.9 lbs. P33 - 13.7 lbs. P34 - 16.2 lbs. Capacity - Diameter Aluminum - .75 hole (18mm) with .930 (25mm) countersink Titahium - .50 hole (13mm) with .75 (18mm) countersink 65 scfm (2.0 HP) .375 NPT (1.0 HP) .5 NPT (2.0 HP) Recommended Hose Size: .5" I.D. (1.0 HP) .75" I.D. (2.0 HP)

Dimensional Data - P3 Drill with Variable Spacing Foot HEAVY DUTY COLLETS AND MANDRELS

Collets and Mandrels are available to accomodate virtually any hole diameter and material thickness. Each size can clamp on thickness variations of .4". Refer to page 4-22 for a complete list of heavy duty Collets and Mandrels.





Position and clamp the drilling template on the workpiece.

3. Insert the Collet into the first hole and locate the Template Boss in the drilling template. Insure that the Collet/Mandrell extends through the workpiece.

- Depress the trigger. Immediately, the Mandrel is drawn back and the Collet locks the tool to the work. Simultaneously, the motor starts and the tool feeds forward to a positive stop. The tool then retracts automatically and returns to its starting position.
- 5. Release the trigger; the motor shuts off and unclamping occurs.
- Reposition the Boss and drill other holes within the colleting Range. Withdraw the Collet/Mandrell and insert into a recently driled hole. Repeat steps 3 through 6.

Model	Attachn	nent No.	Hole	Spindle Offset					
Wodel	Left-Right	Right-Left	Spacing Range	Side-To-Center					
Variable Spacing Foot Specifications									
100	80-419	80-405	1.0-5.6	.75					
101	80-478	80-479	1.0-5.6	.75					
The 100 VSF is at a right angle to the P3 handle and is preferred in open areas. The 101 VSF is approximately 45° from the P3 handle and is preferred in confined areas.									

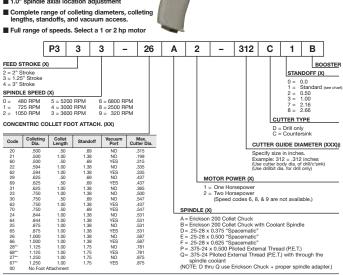
4-12 4-13

DOLER

P3 Drill with Concentric Collet

■ Simple and inexpensive fixturing

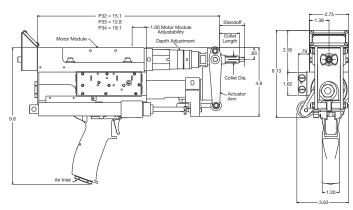
- Very rigid clamp up to your fixture
- No lock/unlock motion required
- Infinite feed control rate
- No radial orientation of tooling is required
- Bushing holes can overlap for closer spacing
- Micro Depth Adjustment depths within .001"
- 1.0" spindle axial location adjustment



Diameter n -.75 hole (18mm) with .930 (25mm)

Weight: P32 - 13.6 lbs. P33 - 12.4 lbs. P34 - 14.9 lbs. P34 - 14.9 lbs. EXTRA COST ACCESSORIE Drill Point Lubricator Handling Ring Ventur Vacuum Erickson 200 cm

Dimensional Data - P3 Drill with Concentric Collet



Standoff is the distance between the Fixture Plate and Workpiece. It is necessary to provide a clearance area for chips (swarf).

The holes in the Fixture Plate should be the nominal Collet diameter \pm .003, \pm .000.

.003, - .000. When using Vacuum Collection, the Concentric Collet is moved outboard by .75°. A .50° diameter vacuum collector port is provided in front of the Foot. The Venturi Vacuum accessory or a separate vacuum system can be attached to the vacuum port.

Refer to pages 14 and 15 for Concentric Collet tooling and operation.

4-14 4-15

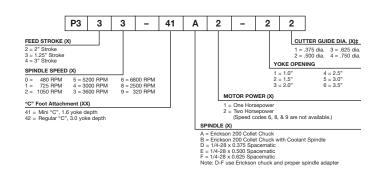


■ 1.0" spindle axial location adjustment to position drill point

■ Infinitely adjustable feed rate control

■ Drill point lubrication

■ Full range of speeds. Select 1 or 2 hp motor



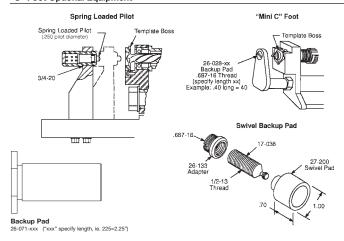
omplete Check Sheet on page 4-00 e placing order. pecify Drill/CS when placing order

Thrust: 320 lbs. @ 80 psig Depth Accuracy: Repeatable within .001" Capacity - Diameter

leight: P32 - 13.8 lbs. P33 - 12.6 lbs. P34 - 15.1 lbs.

0 OPERATION: Set Template Boss into your strip template or fixture. When Set Template Boss into your strip template or fixture. When the trigger is pulled the backup pad is pulled firmly against the rear surface of the workpiece. Immediately, the motor starts and the P3 drills and countersinks to set depth and retracts. When the trigger is released, the motor stops and unclamping occurs.

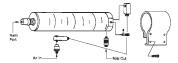
"C" Foot Optional Equipment



4-16 4-17

Doler Self Colleting Machines Accessories

PL Drill Point Lubricator 85-044

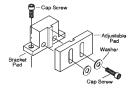


The Drill Point Lubricator provides lubricated air to the point of the cutter. The Doler PL Lubricator is mounted on the Control Valve Module. The Drill Point Lubricator has a guick disconnect fitting for rapid no-mess refilling; use 80-503 Wall Tank to refill it or it can be filled manually and requires no additional equipment. Refer to page 17.

Adjustable Foot Pad 80-897 for 101 Foot 80-925 for 100 Foot

4-18

The Foot Pad levels the Variable Spacing Foot so that the drilled hole is perpendicular to the surface. The projection length of the Foot Pad (xx) depends upon the projection length of the Template Boss, thickness of the Template and radius of the workpiece. See service literature for diagram.



Wall Tank

The 80-503 Wall Tank (2 gallon) can be conveniently located in the work area or tool crib. The Drill Point Lubricator can then be refilled via the quick disconnect fitting (included).

Boelube®, MIcrolube®, or similar cutting lubricants work very well. A very small amount is required to properly lubricate the cutting tool.



Template Boss

- Determine Template Hole Diameter and Thickness. Select the proper Template Boss from the chart below.
- Boss length "L" must be greater than Template greater tha Thickness.



Template Hole Dia.	Boss Projection "C"	Boss I.D.	Boss Part No.
.500	.062	.39	44-203
.500	.100	.39	44-212
.500	.150	.39	44-215
.625	.062	.51	44-202
.625	.100	.51	44-211
.625	.150	.51	44-214
.750	.100	.64	44-210
.750	.150	.64	44-213
.875	.150	.69	44-221
.875	.200	.69	44-259
1.000	.080	.81	44-222
1.000	.100	.81	44-208
1.000	.150	.81	44-209
1.000	.175	.81	44-281
1.125	.100	1.00	44-204
1.125	.150	1.00	44-220
1.250	.200	1.12	44-253

Other combinations of Hole Diameter (1.25" max.) and Length "L" can be provided.

Doler Self Colleting Machines Accessories

Handling Ring (for P2 and P3 Drills)



A 9" diameter, rubber covered, ring that encircles and protects the P3 when it is laid down. It also provides a convenient way to carry the tool. The Handling Ring can be used with an overhead balancer to put the spindle in a horizontal position.

Handling Ring number 58-316 fits the P33. Handling Ring number 58-271-02 fits the P32 and P34. Handling Ring number 56-095 fits the P2.

Spindle Adapters

Spindle Adapter for Threaded Shank Cutters (use with number 212 Collet)

Part Number	Thread x Body Diameter	Overall Length
32-009	.25"-28 x 0.375"	2.4
32-048	.25"-28 x 0.375"	4.0
32-049	.25"-28 x 0.375"	6.0
32-050-1	.25"-28 x 0.500"	2.5
32-050-2	.25"-28 x 0.500"	4.0
32-050-3	.25"-28 x 0.500"	3.5
32-050-4	.25"-28 x 0.500"	5.0
32-050-5	.25"-28 x 0.500"	4.2
32-050-6	.25"-28 x 0.500"	5.7
32-050-7	.25"-28 x 0.500"	5.2
32-050-8	.25"-28 x 0.500"	6.7
32-050-9	.25"-28 x 0.500"	4.7
32-071-1	.25"-28 x 0.625"	2.5
32-071-2	.25"-28 x 0.625"	4.0
32-071-3	.25"-28 x 0.625"	3.5
32-071-4	.25"-28 x 0.625"	5.0
32-071-5	.25"-28 x 0.625"	4.2
32-071-6	.25"-28 x 0.625"	5.7

Replace the motor muffler. The air motor exhaust is routed through a venturi port to create a vacuum. The vacuum is then used to pick up dust and small chips that are hazardous to the environment. The dust and chips are collected in a disposable bag.

27-055 Inlet Manifold (for P3 Drills)

82-135 Venturi Vacuum (for P3 Drills)

Used when mounting the P3 for stationary applications. Provides two NPT ports for using an external 4-way valve. Replaces the handle

527696 Foot Valve (for P3 Drills)

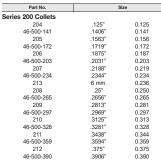
Spring loaded 4-way vale: can be used with 27-055 Manifold for Foot operation of the P3. Includes foot shield.

82-104 Rear Bail (for P3 Drills)

A convenient mount for an overhead balancer. Puts the spindle of the P3 in the vertical position.

4-19

Spindle Collets



Add "C" to the part number for use with Thru-the-Spindle Coolant. Slots are filled with elastomer.

DOLER°

Clamping Collets and Mandrels for P3 Drills with Variable Spacing Foot

Clamping Collets and Mandrels are the components that are inserted into existing holes and then clamp the Doler P3 to the workpiece.

P3 to the workpiece.
At cycle start, the Mandrel is rapidly pulled, expanding the front flange on the collet then pulling back until the collet clamps limity on the rear side of the workpiece.
The Collet diameter must match the drilled hole diameter to facilitate clamp-up and installation/removal. The collet grip length must accommodate the thickest section of material to be drilled. The Grip Range (pull-up

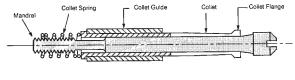
Attribute spacing FOV:

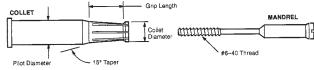
stroke) provides for clamping on thinner sections.

A given collet works in a narrow diameter and grip range.

Consequently, there are a lot of collets and mandrels required to cover the range of holes to be drilled.

NOTE: Doler Mandrels are interchangeable with competitive Mandrels. Doler Collets taper between the colleting diameter and pilot diameter. This is necessary for smooth operation. Competitive Collets have a sharp step but can be modified to work properly.





Grip Range*	Length Code**	Base Collet Number	Collet Overall Length	Base Mandrel Number	Mandrel Overall Length
Collet Grip Cha	art				
0 - 0.52	- 40	46-000-xxx	1.95	46-100-xxx	2.75
0.27 - 0.77	- 63	46-001-xxx	2.20	46-101-xxx	3.00
0.52 - 1.02	- 90	46-002-xxx	2.45	46-102-xxx	3.25
0.77 - 1.27	- 115	46-003-xxx	2.70	46-103-xxx	3.50
1.02 - 1.52	- 140	46-004-xxx	2.95	46-104-xxx	3.75
1.27 - 1.77	- 163	46-005-xxx	3.18	46-105-xxx	4.00
1.52 - 2.02	- 190	46-006-xxx	3.45	46-106-xxx	4.25
1.77 - 2.27	- 215	46-007-xxx	3.70	46-107-xxx	4.50
2.02 - 2.52	- 240	46-008-xxx	3.95	46-108-xxx	4.75
2.27 - 2.77	- 263	46-009-xxx	4.18	46-109-xxx	5.00
2.52 - 3.02	- 290	46-010-xxx	4.45	46-110-xxx	5.25
NOTE: Material thickne NOTE: The Collet Code system still used by m provided for reference	e is an old numbering nany customers. It is	the application. Selection and Base Mandrel Nu	ata assumes a Template	Refer to the following p and determine the con number. There is some range. If the hole size a smaller size, NOTE: A	plete Collet and Mand overlap in the diamete s in the overlap, use the

smaller size. NOTE three Collet sizes.

Doler P3 Collets and Mandrels

Min. Hole Size	Max. Hole Size	Collet Code	Collet Number	Mandrel Number	Min. Hole Size	Max. Hole Size	Collet Code	Collet Number	Mandrel Number
			_					_	
		Is for P3 S					Is for P3 S		
0.1550	0.1620	.1562-40	46-000-156	46-100-156	0.1915	0.1995	.1927-40	46-000-192	46-100-187
0.1550	0.1620	.1562-63	46-001-156	46-101-156	0.1915	0.1995	.1927-63	46-001-192	46-101-187
0.1550	0.1620	.1562-90	46-002-156	46-102-156	0.1915	0.1995	.1927-90	46-002-192	46-102-187
0.1550	0.1620	.1562-115	46-003-156	46-103-156	0.1915	0.1995	.1927-115	46-003-192	46-103-187
0.1550	0.1620	.1562-140	46-004-156	46-104-156	0.1915	0.1995	.1927-140	46-004-192	46-104-187
0.1550	0.1620	.1562-163	46-005-156	46-105-156	0.1915	0.1995	.1927-163	46-005-192	46-105-187
0.1550	0.1620	.1562-190	46-006-156	46-106-156	0.1915	0.1995	.1927-190	46-006-192	46-106-187
0.1600	0.1670	.1614-40	46-000-161	46-100-156	0.1915	0.1995	.1927-215	46-007-192	46-107-187
0.1600	0.1670	.1614-63	46-001-161	46-101-156	0.1970	0.2050	.1979-40	46-000-197	46-100-203
0.1600	0.1670	.1614-90	46-002-161	46-102-156	0.1970	0.2050	.1979-63	46-001-197	46-101-203
0.1600	0.1670	.1614-115	46-003-161	46-103-156	0.1970	0.2050	.1979-90	46-002-197	46-102-203
0.1600	0.1670	.1614-140	46-004-161	46-104-156	0.1970	0.2050	.1979-115	46-003-197	46-103-203
0.1600	0.1670	.1614-163	46-005-161	46-105-156	0.1970	0.2050	.1979-140	46-004-197	46-104-203
0.1600	0.1670	.1614-190	46-006-161	46-106-156	0.1970	0.2050	.1979-163	46-005-197	46-105-203
0.1655	0.1735	.1667-40	46-000-166	46-100-172	0.1970	0.2050	.1979-190	46-006-197	46-106-203
0.1655	0.1735	.1667-63	46-001-166	46-101-172	0.1970	0.2050	.1979-215	46-007-197	46-107-203
0.1655	0.1735	.1667-90	46-002-166	46-102-172	0.2025	0.2105	.2031-40	46-000-203	46-100-203
0.1655	0.1735	.1667-115	46-003-166	46-103-172	0.2025	0.2105	.2031-63	46-001-203	46-101-203
0.1655	0.1735	.1667-140	46-004-166	46-104-172	0.2025	0.2105	.2031-90	46-002-203	46-102-203
0.1655	0.1735	.1667-163	46-005-166	46-105-172	0.2025	0.2105	.2031-115	46-003-203	46-103-203
0.1655	0.1735	.1667-190	46-006-166	46-106-172	0.2025	0.2105	.2031-140	46-004-203	46-104-203
0.1710	0.1790	.1719-40	46-000-172	46-100-172	0.2025	0.2105	.2031-163	46-005-203	46-105-203
0.1710	0.1790	.1719-63	46-001-172	46-101-172	0.2025	0.2105	.2031-190	46-006-203	46-106-203
0.1710	0.1790	.1719-90	46-002-172	46-102-172	0.2025	0.2105	.2031-215	46-007-203	46-107-203
0.1710	0.1790	.1719-115	46-003-172	46-103-172	0.2075	0.2155	.2083-40	46-000-208	46-100-203
0.1710	0.1790	.1719-140	46-004-172	46-104-172	0.2075	0.2155	.2083-63	46-001-208	46-101-203
0.1710	0.1790	.1719-163	46-005-172	46-105-172	0.2075	0.2155	.2083-90	46-002-208	46-102-203
0.1710	0.1790	.1719-190	46-006-172	46-106-172	0.2075	0.2155	.2083-115	46-003-208	46-103-203
0.1765	0.1845	.1771-40	46-000-177	46-100-172	0.2075	0.2155	.2083-140	46-004-208	46-104-203
0.1765	0.1845	.1771-63	46-001-177	46-101-172	0.2075	0.2155	.2083-163	46-005-208	46-105-203
0.1765	0.1845	.1771-90	46-002-177	46-102-172	0.2075	0.2155	.2083-190	46-006-208	46-106-203
0.1765	0.1845	.1771-115	46-003-177	46-103-172	0.2075	0.2155	.2083-215	46-007-208	46-107-203
0.1765	0.1845	.1771-140	46-004-177	46-104-172	0.2125	0.2205	.2135-40	46-000-213	46-100-219
0.1765	0.1845	.1771-163	46-005-177	46-105-172	0.2125	0.2205	.2135-63	46-001-213	46-101-219
0.1765	0.1845	.1771-190	46-006-177	46-106-172	0.2125	0.2205	.2135-90	46-002-213	46-102-219
0.1815	0.1895	.1823-40	46-000-182	46-100-187	0.2125	0.2205	.2135-115	46-003-213	46-103-219
0.1815	0.1895	.1823-63	46-001-182	46-101-187	0.2125	0.2205	.2135-140	46-004-213	46-104-219
0.1815	0.1895	.1823-90	46-002-182	46-102-187	0.2125	0.2205	.2135-163	46-005-213	46-105-219
0.1815	0.1895	.1823-115	46-003-182	46-103-187	0.2125	0.2205	.2135-190	46-006-213	46-106-219
0.1815	0.1895	.1823-140	46-004-182	46-104-187	0.2125	0.2205	.2135-215	46-007-213	46-107-219
0.1815	0.1895	.1823-163	46-005-182	46-105-187	0.2175	0.2255	.2188-40	46-000-219	46-100-219
0.1815	0.1895	.1823-190	46-006-182	46-106-187	0.2175	0.2255	.2188-63	46-001-219	46-101-219
0.1865	0.1945	.1875-40	46-000-187	46-100-187	0.2175	0.2255	.2188-90	46-002-219	46-102-219
0.1865	0.1945	.1875-63	46-001-187	46-101-187	0.2175	0.2255	.2188-115	46-003-219	46-103-219
0.1865	0.1945	.1875-90	46-002-187	46-102-187	0.2175	0.2255	.2188-140	46-004-219	46-104-219
0.1865	0.1945	.1875-115	46-003-187	46-103-187	0.2175	0.2255	.2188-163	46-005-219	46-105-219
0.1865	0.1945	.1875-140	46-004-187	46-104-187	0.2175	0.2255	.2188-190	46-006-219	46-106-219
0.1865	0.1945	.1875-163	46-005-187	46-105-187	0.2175	0.2255	.2188-215	46-007-219	46-107-219
0.1865	0.1945	.1875-190	46-006-187	46-106-187	0.2175	0.2255	.2188-240	46-008-219	46-108-219
0.1865	0.1945	.1875-215	46-007-187	46-100-187		on Page 4-		.5-000-215	10-100-213
0.1003	0.1343	.1010-215	-0-001-101	-0-101-101	Continued	on rage 4-			

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Doler P3 Collets and Mandrels

DOL	.ER°
Min. Hole Size	Max. Hole Size

Min. Hole Size	Max. Hole Size	Collet Code	Collet Number	Mandrel Number	Min. Hole Size	Max. Hole Size	Collet Code	Collet Number	Mandrel Number
Collets an	d Mandrel	ls for P3 Se	eries (contin	ued)	Collets an	d Mandrel	s for P3 S	eries (contin	ued)
0.2235	0.2315	.2240-40	46-000-224	46-100-219	0.2485	0.2565	.2500-115	46-003-250	46-103-250
0.2235	0.2315	.2240-63	46-001-224	46-101-219	0.2485	0.2565	.2500-140	46-004-250	46-104-250
0.2235	0.2315	.2240-90	46-002-224	46-102-219	0.2485	0.2565	.2500-163	46-005-250	46-105-250
0.2235	0.2315	.2240-115	46-003-224	46-103-219	0.2485	0.2565	.2500-190	46-006-250	46-106-250
0.2235	0.2315	.2240-140	46-004-224	46-104-219	0.2485	0.2565	.2500-215	46-007-250	46-107-250
0.2235	0.2315	.2240-163	46-005-224	46-105-219	0.2485	0.2565	.2500-240	46-008-250	46-108-250
0.2235	0.2315	.2240-190	46-006-224	46-106-219	0.2485	0.2565	.2500-263	46-009-250	46-109-250
0.2235	0.2315	.2240-215	46-007-224	46-107-219	0.2545	0.2625	.2552-40	46-000-255	46-100-250
0.2235	0.2315	.2240-240	46-008-224	46-108-219	0.2545	0.2625	.2552-63	46-001-255	46-101-250
0.2285	0.2365	.2292-40	46-000-229	46-100-234	0.2545	0.2625	.2552-90	46-002-255	46-102-250
0.2285	0.2365	.2292-63	46-001-229	46-101-234	0.2545	0.2625	.2552-115	46-003-255	46-103-250
0.2285	0.2365	.2292-90	46-002-229	46-102-234	0.2545	0.2625	.2552-140	46-004-255	46-104-250
0.2285	0.2365	.2292-115	46-003-229	46-103-234	0.2545	0.2625	.2552-163	46-005-255	46-105-250
0.2285	0.2365	.2292-140	46-004-229	46-104-234	0.2545	0.2625	.2552-190	46-006-255	46-106-250
0.2285	0.2365	.2292-163	46-005-229	46-105-234	0.2545	0.2625	.2552-215	46-007-255	46-107-250
0.2285	0.2365	.2292-190	46-006-229	46-106-234	0.2545	0.2625	.2552-240	46-008-255	46-108-250
0.2285	0.2365	.2292-215	46-007-229	46-107-234	0.2545	0.2625	.2552-263	46-009-255	46-109-250
0.2285	0.2365	.2292-240	46-008-229	46-108-234	0.2595	0.2675	.2604-40	46-000-260	46-100-265
0.2335	0.2415	.2344-40	46-000-234	46-100-234	0.2595	0.2675	.2604-63	46-001-260	46-101-265
0.2335	0.2415	.2344-63	46-001-234	46-101-234	0.2595	0.2675	.2604-90	46-002-260	46-102-265
0.2335	0.2415	.2344-90	46-002-234	46-102-234	0.2595	0.2675	.2604-115	46-003-260	46-103-265
0.2335	0.2415	.2344-115	46-003-234	46-103-234	0.2595	0.2675	.2604-110	46-004-260	46-104-265
0.2335	0.2415	.2344-140	46-004-234	46-104-234	0.2595	0.2675	.2604-163	46-005-260	46-105-265
0.2335	0.2415	.2344-163	46-005-234	46-105-234	0.2595	0.2675	.2604-103	46-006-260	46-106-265
0.2335	0.2415	.2344-103	46-006-234	46-106-234	0.2595	0.2675	.2604-130	46-007-260	46-107-265
0.2335	0.2415	.2344-215	46-007-234	46-107-234	0.2595	0.2675	.2604-213	46-008-260	46-107-203
0.2335	0.2415	.2344-240	46-008-234	46-108-234	0.2595	0.2675	.2604-240	46-009-260	46-109-265
0.2385	0.2415	.2396-40	46-000-239	46-100-234	0.2645	0.2075	.2656-40	46-000-265	46-109-205
0.2385	0.2465	.2396-63	46-001-239	46-101-234	0.2645	0.2725	.2656-63	46-001-265	46-101-265
0.2385	0.2465	.2396-03	46-001-239	46-101-234	0.2645	0.2725	.2656-90	46-001-265	46-101-265
0.2385	0.2465	.2396-90			0.2645	0.2725	.2656-115	46-002-265	46-102-265
0.2385	0.2465	.2396-115	46-003-239 46-004-239	46-103-234	0.2645	0.2725	.2656-115	46-003-265	46-103-265
				46-104-234					
0.2385	0.2465	.2396-163	46-005-239	46-105-234	0.2645	0.2725	.2656-163	46-005-265	46-105-265
0.2385	0.2465	.2396-190	46-006-239	46-106-234	0.2645	0.2725	.2656-190	46-006-265	46-106-265
0.2385	0.2465	.2396-215	46-007-239	46-107-234	0.2645	0.2725	.2656-215	46-007-265	46-107-265
0.2385	0.2465	.2396-240	46-008-239	46-108-234	0.2645	0.2725	.2656-240	46-008-265	46-108-265
0.2385	0.2465	.2396-263	46-009-239	46-109-234	0.2645	0.2725	.2656-263	46-009-265	46-109-265
0.2435	0.2515	.2448-40	46-000-245	46-100-250	0.2645	0.2725	.2656-290	46-010-265	46-110-265
0.2435	0.2515	.2448-63	46-001-245	46-101-250	0.2695	0.2775	.2708-40	46-000-271	46-100-265
0.2435	0.2515	.2448-90	46-002-245	46-102-250	0.2695	0.2775	.2708-63	46-001-271	46-101-265
0.2435	0.2515	.2448-115	46-003-245	46-103-250	0.2695	0.2775	.2708-90	46-002-271	46-102-265
0.2435	0.2515	.2448-140	46-004-245	46-104-250	0.2695	0.2775	.2708-115	46-003-271	46-103-265
0.2435	0.2515	.2448-163	46-005-245	46-105-250	0.2695	0.2775	.2708-140	46-004-271	46-104-265
0.2435	0.2515	.2448-190	46-006-245	46-106-250	0.2695	0.2775	.2708-163	46-005-271	46-105-265
0.2435	0.2515	.2448-215	46-007-245	46-107-250	0.2695	0.2775	.2708-190	46-006-271	46-106-265
0.2435	0.2515	.2448-240	46-008-245	46-108-250	0.2695	0.2775	.2708-215	46-007-271	46-107-265
0.2435	0.2515	.2448-263	46-009-245	46-109-250	0.2695	0.2775	.2708-240	46-008-271	46-108-265
0.2485	0.2565	.2500-40	46-000-250	46-100-250	0.2695	0.2775	.2708-263	46-009-271	46-109-265
0.2485	0.2565	.2500-63	46-001-250	46-101-250	0.2695	0.2775	.2708-290	46-010-271	46-110-265
0.2485	0.2565	.2500-90	46-002-250	46-102-250	Continued	on Page 4-	23		

Min. Hole Size	Max. Hole Size	Collet Code	Collet Number	Mandrel Number	Min. Hole Size	Max. Hole Size	Collet Code	Collet Number	Mandrel Number
0-11-4		I- 4 DO C	! (+!		0-11-4	al Manadaa	- 4 DO C	eries (contin	
0.2745	0.2825	.2760-40	eries (contin 46-000-276		0.2955	0.3035	.2969-190	46-006-297	46-106-297
	0.2825	.2760-40	46-000-276	46-100-281 46-101-281		0.3035			
0.2745 0.2745	0.2825	.2760-63	46-001-276	46-101-281	0.2955 0.2955	0.3035	.2969-215	46-007-297 46-008-297	46-107-297 46-108-297
0.2745	0.2825	.2760-90	46-002-276	46-102-281	0.2955	0.3035	.2969-240	46-008-297	46-108-297
0.2745	0.2825	.2760-115	46-003-276		0.2955	0.3035	.2969-263	46-009-297	
0.2745	0.2825	.2760-140	46-004-276	46-104-281 46-105-281				46-010-297	46-110-297 46-100-297
0.2745	0.2825	.2760-163	46-005-276	46-105-281	0.3015 0.3015	0.3095 0.3095	.3021-40	46-000-302	46-100-297
		.2760-190							
0.2745 0.2745	0.2825 0.2825	.2760-215	46-007-276 46-008-276	46-107-281 46-108-281	0.3015 0.3015	0.3095 0.3095	.3021-90	46-002-302 46-003-302	46-102-297 46-103-297
0.2745	0.2825	.2760-240	46-008-276	46-109-281	0.3015	0.3095	.3021-115	46-003-302	46-103-297
0.2745	0.2825	.2760-263	46-009-276	46-110-281	0.3015	0.3095	.3021-140	46-004-302	46-104-297
0.2745	0.2885	.2812-40	46-010-276	46-110-281	0.3015	0.3095	.3021-103	46-005-302	46-105-297
0.2805	0.2885	.2812-40	46-000-281	46-100-281	0.3015	0.3095	.3021-190	46-006-302	46-100-297
0.2805	0.2885	.2812-90	46-001-261	46-101-261	0.3015	0.3095	.3021-215	46-007-302	46-107-297
0.2805	0.2885	.2812-115	46-002-261	46-102-261	0.3015	0.3095	.3021-240	46-008-302	46-108-297
0.2805	0.2885	.2812-115	46-003-261	46-103-261	0.3015	0.3095	.3021-203	46-009-302	46-110-297
0.2805	0.2885	.2812-140	46-004-261	46-104-281	0.3015	0.3095	.3073-40	46-010-302	46-110-297
0.2805	0.2885	.2812-103	46-005-261	46-105-261	0.3065	0.3145	.3073-40	46-000-307	46-100-312
0.2805	0.2885	.2812-190	46-006-281	46-100-281	0.3065	0.3145	.3073-63	46-001-307	46-101-312
0.2805	0.2885	.2812-240	46-008-281	46-107-281	0.3065	0.3145	.3073-30	46-002-307	46-103-312
0.2805	0.2885	.2812-240	46-009-281	46-109-281	0.3065	0.3145	.3073-113	46-003-307	46-103-312
0.2805	0.2885	.2812-203	46-010-281	46-110-281	0.3065	0.3145	.3073-140	46-005-307	46-105-312
0.2855	0.2935	.2864-40	46-000-286	46-100-281	0.3065	0.3145	.3073-103	46-005-307	46-106-312
0.2855	0.2935	.2864-63	46-001-286	46-101-281	0.3065	0.3145	.3073-150	46-007-307	46-107-312
0.2855	0.2935	.2864-90	46-002-286	46-101-281	0.3065	0.3145	.3073-213	46-007-307	46-107-312
0.2855	0.2935	.2864-115	46-003-286	46-103-281	0.3065	0.3145	.3073-240	46-009-307	46-109-312
0.2855	0.2935	.2864-140	46-004-286	46-104-281	0.3065	0.3145	.3073-200	46-010-307	46-110-312
0.2855	0.2935	.2864-163	46-005-286	46-105-281	0.3115	0.3195	.3125-40	46-000-312	46-100-312
0.2855	0.2935	.2864-190	46-006-286	46-106-281	0.3115	0.3195	.3125-63	46-001-312	46-101-312
0.2855	0.2935	.2864-215	46-007-286	46-107-281	0.3115	0.3195	.3125-90	46-002-312	46-102-312
0.2855	0.2935	.2864-240	46-008-286	46-108-281	0.3115	0.3195	.3125-115	46-003-312	46-103-312
0.2855	0.2935	.2864-263	46-009-286	46-109-281	0.3115	0.3195	.3125-140	46-004-312	46-104-312
0.2855	0.2935	.2864-290	46-010-286	46-110-281	0.3115	0.3195	.3125-163	46-005-312	46-105-312
0.2905	0.2985	.2916-40	46-000-291	46-100-297	0.3115	0.3195	.3125-190	46-006-312	46-106-312
0.2905	0.2985	.2916-63	46-001-291	46-101-297	0.3115	0.3195	.3125-215	46-007-312	46-107-312
0.2905	0.2985	.2916-90	46-002-291	46-102-297	0.3115	0.3195	.3125-240	46-008-312	46-108-312
0.2905	0.2985	.2916-115	46-003-291	46-103-297	0.3115	0.3195	.3125-263	46-009-312	46-109-312
0.2905	0.2985	.2916-140	46-004-291	46-104-297	0.3115	0.3195	.3125-290	46-010-312	46-110-312
0.2905	0.2985	.2916-163	46-005-291	46-105-297	0.3165	0.3245	.3177-40	46-000-317	46-100-312
0.2905	0.2985	.2916-190	46-006-291	46-106-297	0.3165	0.3245	.3177-63	46-001-317	46-101-312
0.2905	0.2985	.2916-215	46-007-291	46-107-297	0.3165	0.3245	.3177-90	46-002-317	46-102-312
0.2905	0.2985	.2916-240	46-008-291	46-108-297	0.3165	0.3245	.3177-115	46-003-317	46-103-312
0.2905	0.2985	.2916-263	46-009-291	46-109-297	0.3165	0.3245	.3177-140	46-004-317	46-104-312
0.2905	0.2985	.2916-290	46-010-291	46-110-297	0.3165	0.3245	.3177-163	46-005-317	46-105-312
0.2955	0.3035	.2969-40	46-000-297	46-100-297	0.3165	0.3245	.3177-190	46-006-317	46-106-312
0.2955	0.3035	.2969-63	46-001-297	46-101-297	0.3165	0.3245	.3177-215	46-007-317	46-107-312
0.2955	0.3035	.2969-90	46-002-297	46-102-297	0.3165	0.3245	.3177-240	46-008-317	46-108-312
0.2955	0.3035	.2969-115	46-003-297	46-103-297	0.3165	0.3245	.3177-263	46-009-317	46-109-312
0.2955	0.3035	.2969-140	46-004-297	46-104-297	0.3165	0.3245	.3177-290	46-010-317	46-110-312
0.2955	0.3035	.2969-163	46-005-297	46-105-297	Continued	on Page 4-	24		

Doler P3 Collets and Mandrels

DOL	ED°								
Min. Hole Size	Max. Hole Size	Collet Code	Collet Number	Mandrel Number	Min. Hole Size	Max. Hole Size	Collet Code	Collet Number	Mandi Numb
			eries (contin					eries (contin	
0.3215	0.3295	.3229-40	46-000-323	46-100-328	0.3425	0.3505	.3438-190	46-006-344	46-106-
0.3215	0.3295	.3229-63	46-001-323	46-101-328	0.3425	0.3505	.3438-215	46-007-344	46-107-
0.3215	0.3295	.3229-90	46-002-323	46-102-328	0.3425	0.3505	.3438-240	46-008-344	46-108-
0.3215	0.3295	.3229-115	46-003-323	46-103-328	0.3425	0.3505	.3438-263	46-009-344	46-109
0.3215	0.3295	.3229-140	46-004-323	46-104-328	0.3425	0.3505	.3438-290	46-010-344	46-110-
0.3215	0.3295	.3229-163	46-005-323	46-105-328	0.3475	0.3555	.3490-40	46-000-349	46-100
0.3215	0.3295	.3229-190	46-006-323	46-106-328	0.3475	0.3555	.3490-63	46-001-349	46-101
0.3215	0.3295	.3229-215	46-007-323	46-107-328	0.3475	0.3555	.3490-90	46-002-349	46-102
0.3215	0.3295	.3229-240	46-008-323	46-108-328	0.3475	0.3555	.3490-115	46-003-349	46-103
0.3215	0.3295	.3229-263	46-009-323	46-109-328	0.3475	0.3555	.3490-140	46-004-349	46-104
0.3215	0.3295	.3229-290	46-010-323	46-110-328	0.3475	0.3555	.3490-163	46-005-349	46-105
0.3275	0.3355	.3281-40	46-000-328	46-100-328	0.3475	0.3555	.3490-190	46-006-349	46-106
0.3275	0.3355	.3281-63	46-001-328	46-101-328	0.3475	0.3555	.3490-215	46-007-349	46-107
0.3275	0.3355	.3281-90	46-002-328	46-102-328	0.3475	0.3555	.3490-240	46-008-349	46-108
0.3275	0.3355	.3281-115	46-003-328	46-103-328	0.3475	0.3555	.3490-263	46-009-349	46-109
0.3275	0.3355	.3281-140	46-004-328	46-104-328	0.3475	0.3555	.3490-290	46-010-349	46-110
0.3275	0.3355	.3281-163	46-005-328	46-105-328	0.3535	0.3615	.3542-40	46-000-354	46-100
0.3275	0.3355	.3281-190	46-006-328	46-106-328	0.3535	0.3615	.3542-63	46-001-354	46-101
0.3275	0.3355	.3281-215	46-007-328	46-107-328	0.3535	0.3615	.3542-90	46-002-354	46-102
0.3275	0.3355	.3281-240	46-008-328	46-108-328	0.3535	0.3615	.3542-115	46-003-354	46-103
0.3275	0.3355	.3281-263	46-009-328	46-109-328	0.3535	0.3615	.3542-140	46-004-354	46-104
0.3275	0.3355	.3281-290	46-010-328	46-110-328	0.3535	0.3615	.3542-163	46-005-354	46-105
0.3325	0.3405	.3333-40	46-000-333	46-100-328	0.3535	0.3615	.3542-190	46-006-354	46-106
0.3325	0.3405	.3333-63	46-001-333	46-101-328	0.3535	0.3615	.3542-215	46-007-354	46-107
0.3325	0.3405	.3333-90	46-002-333	46-102-328	0.3535	0.3615	.3542-240	46-008-354	46-108
0.3325	0.3405	.3333-115	46-003-333	46-103-328	0.3535	0.3615	.3542-263	46-009-354	46-109
0.3325	0.3405	.3333-140	46-004-333	46-104-328	0.3535	0.3615	.3542-290	46-010-354	46-110-
0.3325	0.3405	.3333-163	46-005-333	46-105-328	0.3585	0.3665	.3594-40	46-000-359	46-100
0.3325	0.3405	.3333-190	46-006-333	46-106-328	0.3585	0.3665	.3594-63	46-001-359	46-101
0.3325	0.3405	.3333-215	46-007-333	46-107-328	0.3585	0.3665	.3594-90	46-002-359	46-102
0.3325	0.3405	.3333-240	46-008-333	46-108-328	0.3585	0.3665	.3594-115	46-003-359	46-103
0.3325	0.3405	.3333-263	46-009-333	46-109-328	0.3585	0.3665	.3594-140	46-004-359	46-104
0.3325	0.3405	.3333-290	46-010-333	46-110-328	0.3585	0.3665	.3594-163	46-005-359	46-105
0.3375	0.3455	.3385-40	46-000-338	46-100-344	0.3585	0.3665	.3594-190	46-006-359	46-106
0.3375	0.3455	.3385-63	46-001-338	46-101-344	0.3585	0.3665	.3594-215	46-007-359	46-107
0.3375	0.3455	.3385-90	46-002-338	46-102-344	0.3585	0.3665	.3594-240	46-008-359	46-108
0.3375	0.3455	.3385-115	46-003-338	46-103-344	0.3585	0.3665	.3594-263	46-009-359	46-109
0.3375	0.3455	.3385-140	46-004-338	46-104-344	0.3585	0.3665	.3594-290	46-010-359	46-110-
0.3375	0.3455	.3385-163	46-005-338	46-105-344	0.3635	0.3715	.3646-40	46-000-364	46-100
0.3375	0.3455	.3385-190	46-006-338	46-106-344	0.3635	0.3715	.3646-63	46-001-364	46-101
0.3375	0.3455	.3385-215	46-007-338	46-107-344	0.3635	0.3715	.3646-90	46-002-364	46-102
0.3375	0.3455	.3385-240	46-008-338	46-108-344	0.3635	0.3715	.3646-115	46-003-364	46-103
0.3375	0.3455	.3385-263	46-009-338	46-109-344	0.3635	0.3715	.3646-140	46-004-364	46-104
0.3375	0.3455	.3385-290	46-010-338	46-110-344	0.3635	0.3715	.3646-163	46-005-364	46-105
0.3425	0.3505	.3438-40	46-000-344	46-100-344	0.3635	0.3715	.3646-190	46-006-364	46-106
0.3425	0.3505	.3438-63	46-001-344	46-101-344	0.3635	0.3715	.3646-215	46-007-364	46-107
0.3425	0.3505	.3438-90	46-002-344	46-102-344	0.3635	0.3715	.3646-240	46-008-364	46-108
0.3425	0.3505	.3438-115	46-003-344	46-103-344	0.3635	0.3715	.3646-263	46-009-364	46-109
0.3425	0.3505	.3438-140	46-004-344	46-104-344	0.3635	0.3715	.3646-290	46-010-364	46-110-
0.3425	0.3505	.3438-163	46-005-344	46-105-344	Continued			.5 0 10 004	

Min. Hole Size	Max. Hole Size	Collet Code	Collet Number	Mandrel Number	Min. Hole Size	Max. Hole Size	Collet Code	Collet Number	Mandrel Number
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			eries (contin					eries (contin	
0.3685 0.3685	0.3765 0.3765	.3698-40 .3698-63	46-000-370 46-001-370	46-100-375 46-101-375	0.3895 0.3895	0.3975 0.3975	.3906-190 .3906-215	46-006-390 46-007-390	46-106-390 46-107-390
0.3685	0.3765	.3698-63	46-001-370	46-101-375	0.3895	0.3975	.3906-215	46-007-390	46-107-390
0.3685			46-002-370		0.3895				46-108-390
0.3685	0.3765	.3698-115	46-003-370	46-103-375	0.3895	0.3975 0.3975	.3906-263	46-009-390 46-010-390	46-110-390
0.3685	0.3765 0.3765	.3698-140	46-004-370	46-104-375 46-105-375	0.3945	0.3975	.3958-40	46-010-390	46-110-390
0.3685	0.3765		46-005-370		0.3945	0.4025	.3958-63	46-000-396	46-100-390
0.3685	0.3765	.3698-190	46-006-370	46-106-375 46-107-375	0.3945	0.4025	.3958-90	46-001-396	46-101-390
0.3685	0.3765	.3698-240	46-007-370	46-107-375	0.3945	0.4025	.3958-115	46-002-396	46-102-390
0.3685	0.3765	.3698-263	46-008-370		0.3945	0.4025		46-003-396	46-103-390
0.3685	0.3765	.3698-290	46-009-370	46-109-375 46-110-375	0.3945	0.4025	.3958-140	46-005-396	46-104-390
0.3735	0.3765	.3750-40	46-010-370		0.3945	0.4025		46-005-396	46-105-390
0.3735	0.3815	.3750-40	46-000-375	46-100-375 46-101-375	0.3945	0.4025	.3958-190	46-006-396	46-106-390
0.3735	0.3815	.3750-63	46-001-375	46-101-375		0.4025		46-007-396	46-107-390
0.3735					0.3945 0.3945	0.4025	.3958-240		46-108-390
0.3735	0.3815 0.3815	.3750-115	46-003-375 46-004-375	46-103-375 46-104-375		0.4025	.3958-263	46-009-396 46-010-396	46-110-390
0.3735	0.3815	.3750-140	46-004-375	46-104-375	0.3945 0.3995	0.4025	.4010-40	46-010-396	46-110-390
0.3735	0.3815	.3750-163	46-005-375		0.3995	0.4075		46-000-401	46-100-406
0.3735	0.3815	.3750-190	46-006-375	46-106-375 46-107-375		0.4075	.4010-63 .4010-90	46-001-401	46-101-406
0.3735	0.3815	.3750-215			0.3995	0.4075		46-002-401	46-102-406
			46-008-375 46-009-375	46-108-375	0.3995		.4010-115		46-103-406
0.3735 0.3735	0.3815 0.3815	.3750-263	46-009-375	46-109-375 46-110-375	0.3995 0.3995	0.4075 0.4075	.4010-140	46-004-401 46-005-401	46-104-406
0.3735	0.3875	.3802-40	46-010-375	46-110-375	0.3995	0.4075	.4010-163	46-005-401	46-105-406
0.3795	0.3875	.3802-40	46-000-380	46-100-375	0.3995	0.4075	.4010-190	46-006-401	46-100-406
0.3795	0.3875	.3802-90	46-001-380	46-101-375	0.3995	0.4075	.4010-215	46-007-401	46-107-406
0.3795	0.3875	.3802-90	46-002-360	46-102-375	0.3995	0.4075	.4010-240	46-009-401	46-109-406
0.3795	0.3875	.3802-115	46-003-360	46-103-375	0.3995	0.4075	.4010-203	46-010-401	46-110-406
0.3795	0.3875	.3802-140	46-004-380	46-104-375	0.3995	0.4075	.4010-290	46-010-401	46-110-406
0.3795	0.3875	.3802-163	46-005-380	46-105-375	0.4055	0.4135	.4062-40	46-000-406	46-100-406
0.3795	0.3875	.3802-150	46-007-380	46-100-375	0.4055	0.4135	.4062-03	46-002-406	46-102-406
0.3795	0.3875	.3802-213	46-008-380	46-108-375	0.4055	0.4135	.4062-30	46-003-406	46-103-406
0.3795	0.3875	.3802-240	46-009-380	46-109-375	0.4055	0.4135	.4062-113	46-003-406	46-103-406
0.3795	0.3875	.3802-203	46-010-380	46-110-375	0.4055	0.4135	.4062-140	46-005-406	46-105-406
0.3795	0.3925	.3854-40	46-000-385	46-100-390	0.4055	0.4135	.4062-103	46-006-406	46-106-406
0.3845	0.3925	.3854-63	46-001-385	46-101-390	0.4055	0.4135	.4062-150	46-007-406	46-107-406
0.3845	0.3925	.3854-90	46-002-385	46-101-390	0.4055	0.4135	.4062-213	46-008-406	46-108-406
0.3845	0.3925	.3854-115	46-002-385	46-102-390	0.4055	0.4135	.4062-240	46-009-406	46-109-406
0.3845	0.3925	.3854-140	46-003-385	46-103-390	0.4055	0.4135	.4062-203	46-010-406	46-110-406
0.3845	0.3925	.3854-163	46-005-385	46-105-390	0.4035	0.4185	.4114-40	46-000-411	46-100-406
0.3845	0.3925	.3854-190	46-006-385	46-106-390	0.4105	0.4185	.4114-63	46-001-411	46-101-406
0.3845	0.3925	.3854-215	46-007-385	46-107-390	0.4105	0.4185	.4114-90	46-002-411	46-102-406
0.3845	0.3925	.3854-240	46-007-385	46-108-390	0.4105	0.4185	.4114-30	46-002-411	46-102-400
0.3845	0.3925	.3854-263	46-009-385	46-109-390	0.4105	0.4185	.4114-140	46-004-411	46-104-406
0.3845	0.3925	.3854-290	46-010-385	46-110-390	0.4105	0.4185	.4114-140	46-005-411	46-105-406
0.3895	0.3925	.3906-40	46-010-365	46-110-390	0.4105	0.4185	.4114-163	46-005-411	46-105-406
0.3895	0.3975	.3906-40	46-000-390	46-100-390	0.4105	0.4185	.4114-190	46-006-411	46-100-406
0.3895	0.3975	.3906-63	46-001-390	46-101-390	0.4105	0.4185	.4114-215	46-007-411	46-107-406
0.3895	0.3975	.3906-90	46-002-390	46-102-390	0.4105	0.4185	.4114-240	46-009-411	46-109-406
0.3895	0.3975	.3906-115	46-003-390	46-103-390	0.4105	0.4185	.4114-203	46-009-411	46-110-406
0.3895	0.3975	.3906-140	46-005-390	46-105-390		on Page 4-		40-010-411	70-110-400
0.3033	0.3313	.5500-103	-0-000-090	-0-100-030	Commuea	on raye 4-	20		

DOLER®

Min. Hole Mars. Hole Mars. Hole Mars. Hole Mars. Hole Size Collet Mumber Manufer Manuf										
Collets and Mandrels for P3 Series (continued) O.4155	Min. Hole Size	Max. Hole Size	Collet	Collet	Mandrel Number	Min. Hole	Max. Hole	Collet	Collet	Mandrel
0.4155 0.4235 4.166-60 46-000-417 46-100-422 0.4365 0.4445 4.375-60 46-000-437 46-101-437 0.4155 0.4235 4.166-610 46-000-417 46-101-422 0.4365 0.4445 4.375-61 46-001-437 46-101-437 0.4155 0.4235 4.166-114 46-001-447 46-101-422 0.4365 0.4445 4.375-115 46-003-437 46-102-437 0.4155 0.4235 4.166-114 46-000-4417 46-103-422 0.4365 0.4445 4.375-115 46-003-437 46-102-437 0.4155 0.4235 4.166-163 46-006-417 46-103-422 0.4365 0.4445 4.375-116 46-004-347 46-103-432 0.4365 0.4445 4.375-163 46-005-437 46-103-437 0.4155 0.4235 4.166-163 46-006-417 46-105-422 0.4365 0.4445 4.375-163 46-005-437 46-103-437 0.4155 0.4235 4.166-215 46-007-417 46-103-422 0.4365 0.4445 4.375-163 46-005-437 46-103-437 0.4155 0.4235 4.166-216 46-000-417 46-103-422 0.4365 0.4445 4.375-163 46-007-437 46-103-437 0.4155 0.4235 4.166-210 46-006-417 46-103-422 0.4365 0.4445 4.375-215 46-007-437 46-103-437 0.4155 0.4235 4.166-220 46-000-422 0.4365 0.4445 4.375-216 46-008-437 46-103-437 0.4155 0.4235 4.166-290 46-010-417 46-103-422 0.4365 0.4445 4.375-203 46-003-437 46-103-437 0.4155 0.4235 4.166-290 46-010-417 46-103-422 0.4365 0.4445 4.375-203 46-003-437 46-103-437 0.4205 0.4285 4.219-60 46-000-422 46-101-422 0.4365 0.4445 4.375-203 46-010-437 46-103-437 0.4205 0.4285 4.219-80 46-000-422 46-101-422 0.4365 0.4445 4.375-290 46-010-437 46-103-437 0.4205 0.4285 4.219-10 46-003-422 46-103-422 0.4415 0.4495 4.427-10 46-004-443 46-103-437 0.4205 0.4285 4.219-10 46-004-422 46-103-422 0.4415 0.4495 4.427-10 46-004-443 46-103-437 0.4205 0.4285 4.219-10 46-006-422 46-103-422 0.4415 0.4495 4.427-10 46-004-443 46-103-437 0.4205 0.4285 4.219-10 46-006-422 46-103-422 0.4415 0.4495 4.427-10 46-004-443 46-103-437 0.4205 0.4285 4.219-10 46-006-422 46-103-422 0.4415 0.4495 4.427-10 46-004-443 46-103-437 0.4205 0.4285 4.219-230 46-003-424 46-103-422 0.4415 0.4495 4.427-10 46-004-443 46-103-437 0.4205 0.4285 4.219-230 46-003-424 46-103-422 0.4415 0.4495 4.427-10 46-003-443 46-103-437 0.4205 0.4285 4.219-230 46-003-424 46-103-422 0.4415 0.4495 4.427-10 46-003-443 46-103-437 0.42	OILU	OILC	oouc	reamber	I Humber	3120	3126	Code	Number	Number
0.4155	Collets ar	nd Mandre	ls for P3 S	eries (contin	ued)	Collets ar	nd Mandre	s for P3 S	eries (contin	ued)
0.4155	0.4155	0.4235	.4166-40	46-000-417	46-100-422	0.4365	0.4445	.4375-40	46-000-437	46-100-437
0.4155	0.4155	0.4235	.4166-63	46-001-417	46-101-422	0.4365	0.4445	.4375-63	46-001-437	46-101-437
0.4155	0.4155	0.4235	.4166-90	46-002-417	46-102-422	0.4365	0.4445	.4375-90	46-002-437	46-102-437
0.4155	0.4155	0.4235	.4166-115	46-003-417	46-103-422	0.4365	0.4445	.4375-115	46-003-437	46-103-437
0.4155	0.4155	0.4235	.4166-140	46-004-417	46-104-422	0.4365	0.4445	.4375-140	46-004-437	46-104-437
0.4155	0.4155	0.4235	.4166-163	46-005-417	46-105-422	0.4365	0.4445	.4375-163	46-005-437	46-105-437
0.4155	0.4155	0.4235	.4166-190	46-006-417	46-106-422	0.4365	0.4445	.4375-190	46-006-437	46-106-437
0.4155	0.4155	0.4235	.4166-215	46-007-417	46-107-422	0.4365	0.4445	.4375-215	46-007-437	46-107-437
0.4265	0.4155	0.4235	.4166-240	46-008-417	46-108-422	0.4365	0.4445	.4375-240		
0.4205	0.4155	0.4235	.4166-263	46-009-417	46-109-422	0.4365	0.4445	.4375-263	46-009-437	46-109-437
0.4205	0.4155	0.4235	.4166-290	46-010-417	46-110-422	0.4365	0.4445	.4375-290	46-010-437	46-110-437
0.4205	0.4205	0.4285	.4219-40	46-000-422	46-100-422	0.4415	0.4495	.4427-40	46-000-443	46-100-437
0.4205	0.4205	0.4285	.4219-63	46-001-422	46-101-422	0.4415	0.4495	.4427-63	46-001-443	46-101-437
0.4205 0.4285 4.219-140 46-004-422 46-104-322 0.4415 0.4495 4.427-110 46-004-434 46-108-437 0.4205 0.4285 4.219-140 46-004-422 46-108-422 0.4415 0.4495 4.427-163 46-008-443 46-108-437 0.4205 0.4285 4.219-163 46-008-422 46-108-422 0.4415 0.4495 4.427-163 46-008-443 46-108-437 0.4205 0.4285 4.219-169 46-008-422 46-108-422 0.4415 0.4495 4.427-163 46-008-434 46-108-437 0.4205 0.4285 4.219-169 46-008-422 46-108-422 0.4415 0.4495 4.427-163 46-008-434 46-108-437 0.4205 0.4285 4.219-204 46-008-422 46-108-422 0.4415 0.4495 4.427-204 46-008-443 46-108-437 0.4205 0.4285 4.219-204 46-008-422 46-108-422 0.4415 0.4495 4.427-204 46-008-443 46-108-437 0.4205 0.4285 4.219-209 46-010-422 46-108-422 0.4415 0.4495 4.427-204 46-008-443 46-108-437 0.4205 0.4285 4.219-209 46-010-422 46-108-422 0.4415 0.4495 4.427-203 46-010-443 46-108-437 0.4205 0.4285 4.219-209 46-010-422 46-108-422 0.4415 0.4495 4.427-203 46-010-443 46-108-437 0.4205 0.4345 4.271-63 46-000-427 46-100-422 0.4465 0.4595 4.479-40 46-000-448 46-108-435 0.4205 0.4345 4.271-163 46-000-247 46-108-422 0.4465 0.4595 4.479-90 46-002-448 46-103-453 0.4205 0.4345 4.271-163 46-000-427 46-108-422 0.4465 0.4595 4.479-104 46-002-448 46-103-453 0.4205 0.4345 4.271-130 46-008-427 46-108-422 0.4465 0.4595 4.479-104 46-004-448 46-103-453 0.4205 0.4345 4.271-130 46-006-427 46-108-422 0.4465 0.4595 4.479-104 46-004-448 46-103-453 0.4205 0.4345 4.271-130 46-006-427 46-108-422 0.4465 0.4595 4.479-104 46-004-448 46-108-453 0.4205 0.4345 4.271-130 46-006-427 46-108-422 0.4465 0.4595 4.479-104 46-006-448 46-108-453 0.4205 0.4345 4.271-126 46-006-427 46-108-422 0.4465 0.4595 4.479-104 46-006-448 46-108-453 0.4205 0.4345 4.271-126 46-006-427 46-108-422 0.4465 0.4595 4.479-104 46-006-427 46-108-422 0.4465 0.4595 4.479-104 46-006-427 46-108-422 0.4465 0.4595 4.479-104 46-006-427 46-108-423 0.4465 0.4595 4.479-104 46-006-427 46-108-422 0.4465 0.4595 4.479-104 46-006-427 46-108-423 0.4695 0.4595 4.479-104 46-006-427 46-108-423 0.4695 0.4595 4.479-104 46-006-427 46-108-423 0.4695 0.4595 4.479-104 4	0.4205	0.4285	.4219-90	46-002-422	46-102-422	0.4415	0.4495	.4427-90	46-002-443	46-102-437
0.4205	0.4205	0.4285	.4219-115	46-003-422		0.4415	0.4495	.4427-115	46-003-443	46-103-437
0.4205	0.4205	0.4285	.4219-140	46-004-422	46-104-422	0.4415	0.4495	.4427-140	46-004-443	46-104-437
0.4205	0.4205	0.4285	.4219-163	46-005-422	46-105-422	0.4415	0.4495	.4427-163	46-005-443	46-105-437
0.4205	0.4205	0.4285	.4219-190	46-006-422	46-106-422	0.4415	0.4495	.4427-190	46-006-443	46-106-437
0.4205	0.4205	0.4285	.4219-215	46-007-422	46-107-422	0.4415	0.4495	.4427-215	46-007-443	46-107-437
0.4265	0.4205	0.4285	.4219-240	46-008-422	46-108-422	0.4415	0.4495	.4427-240	46-008-443	46-108-437
0.4265	0.4205	0.4285	.4219-263	46-009-422	46-109-422	0.4415	0.4495	.4427-263	46-009-443	46-109-437
0.4265	0.4205	0.4285	.4219-290	46-010-422	46-110-422	0.4415	0.4495	.4427-290	46-010-443	46-110-437
0.4265	0.4265	0.4345	.4271-40	46-000-427	46-100-422	0.4465	0.4545	.4479-40	46-000-448	46-100-453
0.4265	0.4265	0.4345	.4271-63			0.4465	0.4545	.4479-63	46-001-448	46-101-453
0.4265	0.4265	0.4345	.4271-90	46-002-427	46-102-422	0.4465	0.4545	.4479-90	46-002-448	46-102-453
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0.4265	0.4265	0.4345	.4271-163	46-005-427	46-105-422	0.4465	0.4545		46-005-448	46-105-453
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0.4315 0.4395 .4323-63 46-001-432 46-101-437 0.4525 0.4605 .4531-63 46-001-453 46-101-453 0.4315 0.4395 .4323-90 46-002-432 46-102-437 0.4525 0.4605 .4531-90 46-002-433 46-103-437 0.4315 0.4395 .4323-116 46-004-323 46-103-437 0.4525 0.4605 .4531-140 46-004-432 46-104-437 0.4525 0.4605 .4531-140 46-004-432 46-104-437 0.4525 0.4605 .4531-140 46-004-432 46-104-437 0.4525 0.4605 .4531-140 46-004-432 46-104-437 0.4525 0.4605 .4531-140 46-004-432 46-104-437 0.4525 0.4605 .4531-140 46-004-432 46-104-437 0.4525 0.4605 .4531-140 46-004-433 46-106-433 0.4315 0.4395 .4323-163 46-006-432 46-106-437 0.4525 0.4605 .4531-123 46-007-433 46-106-433 0.4315 0.4395 .4323-245 46-007-432 46-107-437 <td>0.4265</td> <td>0.4345</td> <td>.4271-290</td> <td>46-010-427</td> <td>46-110-422</td> <td>0.4465</td> <td>0.4545</td> <td>.4479-290</td> <td>46-010-448</td> <td>46-110-453</td>	0.4265	0.4345	.4271-290	46-010-427	46-110-422	0.4465	0.4545	.4479-290	46-010-448	46-110-453
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Notes

136SC-B-118 Q-Matic Self-Colleting Drill Motor

Drill Capacity: .25" (6.4mm) Countersink Capacity: .5" (12.7mm)

Feed Stroke: 1.1875" (30.2mm) Clamp Stroke: .5625" (14.3mm)

■ Motor, clamp and retract mechanism are air-operated; feed rate is controlled by metering hydraulic fluid through adjustable orifice.

Semi-automatic self-colleting tool has automatic clamp/drill/retract cycle.

■ 136 series motor develops .85 nominal horsepower.

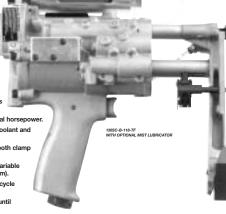
■ Optional mist lubricator introduces coolant and air blast to cutter.

Booster pump accessory increases both clamp and feed pressures.

■ Distance between collet and drill is variable from .5 in. (12.5 mm) to 2.75 in. (70 mm).

■ Tool has trigger lock to allow tool to cycle without operator attention.

■ Tool remains clamped to workpiece until operator releases trigger.



Model	Stroke		Feed Rate Weight v		steel foot		Variable Distance	Inlet	Minimum
	Feed	Collet		lbs	kg	Speeds (RPM)	Collet to Drill		Hose Size
136SC-B-118	1.125 in (28mm)	.5625 in (14mm)	.05 to 40 in/sec 1.25 to 10 mm/sec	7.0	3.2	400, 900, 2100, 3100, 6000, 7800, 11,500,	Min: .5 in (12.7mm) Max. 2.75 in (70mm)	.375" NPT	.5" (12.7mm)

Rated tool performance at 90 PSIG me toll inlet with motor running

- toll inlet with motor running.

 COMMINION REQUIRED FOR FORERING

 TOOL, RPM

 TYPE SPINDLE REQUIRED (seat information concerning the cutter to be utilized in the drilling application must be provided in order to determine the proper spinde configuration. A drawing of the cutter should be provided for each application.
- FOOT TYPE REQUIRED:
 Template Foot Right Hand OR Left Hand
 Jig Collet Foot Depth Sensing
 OR Non-Depth Sensing
 Dril Lock Bushing Foot 21000 series
 OR 2000 Series Bushing

- TOOLING INFORMATION
 Template Foot Models
 Template Boss (see page 4-33)
 Collet/Mandrel Assembly (see page 4-33)
 Ig Collet Foot Models
 For depth sensing models, the stand-off distance (see page 4-31) must be provided.



STRAIGHT HOLE TAPERED HOLE

INFORMATION REQUIRED TO ORDER
JIG COLLET FOOT TOOLS:
(1) Specify tooling plate hole size—diameter A or B—
in order to determine collet size (see standard collet size chart).
(2) When ordering depth sensing modals, specify
stand-off distance. (Top of tooling plate to work surface)
(3) When ordering for straight hole tooling plates,
specify tooling plate thickness.

Drill Lock Bushing Foot

The versatile Q-Matic 136SC Drill is available with a foot which accepts standard 21000 and 22000 series lock-type drill bushings. This foot design increases the versatility of the Q-Matic Drill so that it may be locked onto the rigid tooling plate using various drill bushing tips and their accessories.

Drill Jig Collet Foot

The 136SC Q-Matic Drill is available with a jig collet foot, either with or without a depth sensing sleeve, for use with rigid tooling plates which have STRAIGHT or BACK TAPERED locating holes. This attachment, with a built-in sensing sleeve, will sense variations up to .125" in the distance between the work surface and the top of the tooling plate, which allows production drilling of holes with countersink to precise limits. A port has been provided in the foot to deliver coolant to the drill point.

"C" Yoke

The 136SC is available with a "C" Yoke for perimeter

STANDARD COLLET SIZES

Depth Sensing	Straight Hole A dia. 1.000 .875	Tapered Hole .B dia. .796 .670
Non-Depth Sensing	1.000 .875 .750 .625	.796 .670 .640 .500

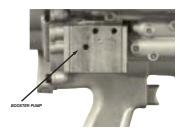
Special collets available upon request.

4-28 4-29

136SC-B-118 Q-Matic Self-Colleting Drill Motor

Booster Pump Assembly

For increased clamping and feed For increased carping and feed force, an optional Booster Pump (Part No. 621462) is available. The pump provides extra clamp and feed when required. The Booster Pump assembly will increase both clamp and feed forces by a factor of 2.5.



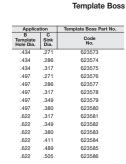
Mist Lubricator Assembly

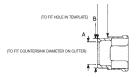
4-30

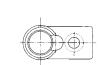


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TEMPLATE BOSS NOTE: TEMPLATE BOSSES ARE OPTIONAL AND ARE TO BE SPECIFIED BY CUSTOMER IF REQUIRED.







Collets and Mandrels

Collets and Mandrels are supplied as standard equipment with each tool and must be specified when ordered.



INFORMATION NECESSARY TO ORDER COLLETS AND MANDRELS HOLE SIZE AND COLLET LENGTH CODE EXAMPLE, Application is to drill a 250 dia. hole in 500 thick material using a template with a thickness of .125 in. SELECT Template Boss (See Template Boss Length information above). This application requires a 150 length. Using Material Thickness Crip Parago came those of n. 500 material thickness, the collet and mandrel Length Code is ETHER .40 or .43



Material Thickness Grip Range							
Temp. Boss Length .150	Collet Length Code*						
Series 1000 Standard Collets							
.0037	- 23						
.1862	- 40						
.4387	- 63						

136SC-150 Q-Matic Self-Colleting Drill Motor

Drill Capacity: .25" (6.4mm) Countersink Capacity: .5" (12.7mm)

Feed Stroke: 1.5" (30mm) Clamp Stroke: .5625" (14.3mm)

- Motor, clamp and retract mechanism are air-operated; feed rate is controlled by external hydraulic feed control cylinder.
- Semi-automatic self-colleting tool has automatic clamp/drill/retract cycle.
- 136 series motor develops .85 nominal horsepower
- Optional mist lubricatorintroducescoolant and air blast to cutter.
- Booster pump accessory increases both clamp and feed pressures.
- Distance between collet and drill is variable from .5 in. (12.5 mm) to 2.75 in. (70 mm).
- Tool has trigger lock to allow tool to cycle without operator attention.
- Tool remains clamped to workpiece until operator releases trigger.



Model	Str	oke	Feed Rate	Feed Rate		Variable Distance	Inlet	Minimum		
	Feed	Collet				Speeds (RPM)	Collet to Drill		Hose Size	
136SC-150	1.5 in (30mm)	.5625 in (14mm)	.05 to 40 in/sec 1.25 to 10 mm/sec	8.0	3.6	400, 900, 2100, 3100, 6000, 7800, 11.500.	Min: .5 in (12.7mm) Max. 2.75 in (70mm)	.375" NPT	.5" (12.7mm)	
	(Julilin)	(1-411111)	1.23 to 10 min/sec			22,500	Wax. 2.75 III (Folilli)		(12.711111)	

- FOOT TYPE REQUIRED:

 Template Foot Right Hand OR Left Hand
 Jig Collet Foot Depth Sensing
 OR Non-Depth Sensing
 Drill Lock Bushing Foot 21000 series
 OR 2000 Series Bushing



Drill alg Collet Foot
The 136SC Q-Matic Drill is available with a jig collet
foot, either with or without a depth sensing sleeve, for
use with rigid tooling plates which have STRAIGHT or
BACK TAPERED locating holes. This attachment,
with a built-in sensing sleeve, will sense variations up
to .125' in the distance between the work surface
and the top of the tooling plate, which allows
production drilling of holes with countersrik to precise
limits. A port has been provided in the foot to deliver
condant to the villi point. coolant to the drill point.

STRAIGHT HOLE TAPERED HOLE

136SC Q-MATIC SELF-COLLETING DRILL WITH DEPTH SENSING JIG COLLET FOOT

INFORMATION REQUIRED TO ORDER JIG COLLET FOOT TOOLS:
(1) Specify tooling plate hole size—diameter A or B—in order to determine collet size (see standard collet size chart).

- (2) When ordering depth sensing models, specify stand-off distance. (Top of tooling plate to work surface) (3) When ordering for straight hole tooling plates, specify tooling plate thickness.

STANDARD COLLET SIZES

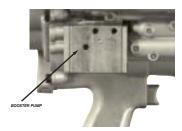
Depth Sensing	Straight Hole A dia. 1.000 .875	Tapered Hole .B dia. .796 .670
Non-Depth Sensing	1.000 .875 .750 .625	.796 .670 .640 .500
Special collets availal	ble upon re	quest.

4-32 4-33

136SC-150 Q-Matic Self-Colleting Drill Motor

Booster Pump Assembly

For increased clamping and feed force, an optional Booster Pump (Part No. 621482) is available. The pump provides extra clamp and feed when required. The Booster Pump assembly will increase both clamp and feed forces by a factor of 2.5.



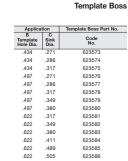
Mist Lubricator Assembly

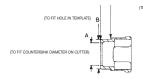
4-34



	100
Standard	Large
631878	•
	631878









Collets and Mandrels

Collets and Mandrels are supplied as standard equipment with each tool and must be specified when ordered.



INFORMATION NECESSARY TO ORDER COLLETS AND MANDRELS HOLE SIZE AND COLLET LENGTH CODE EXAMPLE, Application is to drill a 250 dia. hole in 500 thick material using a template with a thickness of .125 in. SELECT Template Boss (See Template Boss Length information above). This application requires a 150 length. Using Material Thickness Crip Parago came those of n. 500 material thickness, the collet and mandrel Length Code is ETHER .40 or .43



Material Thickn	ess Grip Range						
Temp. Boss Length .150	Collet Length Code*						
Series 1000 Star	Series 1000 Standard Collets						
.0037	- 23						
.1862	- 40						
.4387	- 63						
.68 - 1.12	- 90						

120SC-112 Q-Matic Self-Colleting Drill Drill Capacity: .4375" (11mm)
Countersink Capacity: 5/8" (15.9mm)
Feed Stroke: 1.125" (28.6mm) Clamp Stroke: .5" (12.7mm)

- Semi-automatic self-colleting tool has automatic clamp/drill/retract cycle.
- Air motor, clamping and retract mechanism are air-operated; feed rate controlled by metering hydraulic fluid through an adjustable orifice.
- Tool has feed stroke of 1.125"; collet stroke of .5".
- Spindle can be adjusted to .375 inch to allow for variations in cutter lengths.
- Spindle feed rate is adjustable from .05 in./sec. through .40 in./sec.
- Drill point coolant port is provided in pressure foot.
- Trigger lock feature permits tool to cycle without constant operator attention.
- Spindle continues to rotate in forward direction while tool retracts.
- Tool stays clamped to workpiece until operator releases trigger lock.



Model	Str	oke	Feed Rate			Variable Distance Inlet		Minimum						
	Feed	Collet				lbs kg		lbs kg		lbs kg		lbs kg		Collet to Drill
120SC-112 (10SC)	1.125 in (28mm)	.5 in (12.5mm)	.05 to 4 in/sec	10.8	4.89	270, 470, 700, 900, 1150, 2200, 3500,	Min: .875 in (22mm) Max. 3.50 in (89mm)	.375" NPT	.5" (12.7mm)					
						5500 7000 14000 23500	١							

Rated tool performance at 90 PSIG measured at toll inlet with motor running.

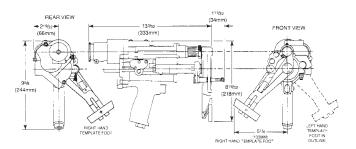
- FOOT TYPE REQUIRED:
 Template Foot Right Hand OR Left Hand
 Jig Collet Foot Depth Sensing
 OR Non-Depth Sensing
- Drill Lock Bushing Foot 21000 series
 OR 22000 Series Bushing

STRAIGHT HOLE

INFORMATION REQUIRED TO ORDER
JIG COLLET FOOT TOOLS:
(1) Specify tooling plate hole size—diameter A or B—
in order to determine collet size (see standard collet size chart).

TAPERED HOLE

(2) When ordering depth sensing models, specify stand-off distance. (Top of tooling plate to work surface) (3) When ordering for straight hole tooling plates, specify tooling plate thickness.



Drill Lock Bushing Foot

The versatile Q-Matic 120SC Drill is available with a foot which accepts standard 21000 and 22000 series lock-type drill bushings. This foot design increases the versatility of the Q-Matic Drill so that it may be locked onto the rigid tooling plate using various drill bushing tips and their accessories.

Drill Jig Collet Foot

The 120SC Q-Matic Drill is available with a jig collet foot, either with or without a depth sensing sleeve, for use with rigid tooling plates which have STRAIGHT or BACK TAPERED locating holes. This attachment, with a built-in sensing sleeve, will sense variations up to .125" in the distance between the work surface and the top of the tooling plate, which allows production drilling of holes with countersink to precise limits. A port has been provided in the foot to deliver coolant to the drill point.

STANDARD COLLET SIZES							
Depth Sensing	Straight Hole A dia. 1.000 .875	Tapered Hole .B dia. .796 .670					
Non-Depth Sensing	1.000 .875 .750 .625	.796 .670 .640					

Special collets available upon request.

4-36 4-37

120SC-D-112 Q-Matic Self-Colleting Drill Motor

Booster Pump Assembly

For increased clamping and feed force, an optional Booster Pump (Part No. 621482) is available. The pump provides extra clamp and feed force when drilling Titanium or taper drilling applications. The Booster Pump assembly will increase both clamp and feed forces by a factor of 2.5. The pump is easily installed on the Q-Matto Drill by replacing the cover supplied with the too with the Booster Pump using the three screws supplied with the pump.



Mist Lubricator Assembly

A mist lubricator assembly is available to introduce coolant and air to the cutter. The lubricator is actuated by air from the accessory air tap on the motor side and only functions when the motor is anning. The standard mist lubricators when the motor is running. The standard mist lubricators (Part No. 6411109 and 641081) are filled with a hand pump. The optional mist lubricators (Part No. 641110 and 641082) are filled by a pressure pump.

	Small	Large
Manual Fill	641109	641081
Pressure Fill	641110	641082



Jig Collet Foot Attachments

Depth Sensing Jig Collet Foot

Depth Sensing Jig Collet Foot

Depth sensing jig collet foot is used for accurately drilling and
countershiding hole layouts utilizing a simple fixture plate. The cutter
passes centrally through the drillmotor collet to produce holes
concentric with the fixture plate holes. The depth sensing sleeve will
drill and accurately countersrink with fixture-to-workpiece variations
of up to .125". Coolant and air blast port is fitted to the foot.
User must specify template hole and drill-countersrink size as well
as drill-countersrink configuration.

Non Depth Sensing Jig Collet Foot

Non-depth sensing Jig Collet Poot
Non-depth sensing jig collet foot is similar to the
above foot without depth sensing capability.
This foot is used for straight drilling applications where
"rough" depth sensing only is required. This foot grips straight
shank drills utilizing an "O-W" type collet.
User must specify template hole and drill size.

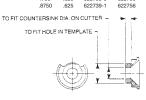


Template Boss



Applica	tion	Template Bo	ss Part No.
B Template Hole Dia.	C Sink Dia.	With .150 Boss Length	With .200 Boss Length
.437	.271	622723-5	622740
.437	.286	622724-3	622741
.437	.317	622725-0	622742
.500	.271	622726-8	622743
.500	.286	622727-6	622744
.500	.317	622728-4	622745
.500	.349	622729-2	622746
.500	.380	622730-0	622747
.625	.317	622731-8	622748
.625	.349	622732-6	622749
.625	.380	622733-4	622750
.625	.411	622734-2	622751
.625	.489	622735-9	622752
.625	.505	622736-7	622753
.750	.505	622737-5	622754
.750	.625	622738-3	622755

NOTE: TEMPLATE BOSS LENGTH MUST EXCEED TEMPLATE THICKNESS THICKNESS TO :187

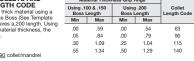


Collets and Mandrels

Collets and Mandrels are supplied as standard equipment with each tool and must be specified when ordered.



INFORMATION NECESSARY TO ORDER COLLETS AND MANDRELS HOLE SIZE AND COLLET LENGTH CODE EXAMPLE. Application is to drill a 375 data. hole in. 500 thick material using a template with a thickness of .130 in. SELECT Template Boss (See Template Boss Lorgh information above). This application requires a 200 length. Usi Matterial Thickness for Parage char bussed on .500 material thickness, the collet and mandrel Length Code is ETHER .450 are .90.



ORDER: .375-90 collet/mandrel

Hole A Collet Size Collet Length Code

4-39 4-38

120SC-225 Q-Matic Self-Colleting Drill

Drill Capacity: .5" (12.7mm) Countersink Capacity: .7813" (19.8mm)

Feed Stroke: 2.25" (57.2mm) Clamp Stroke: .975" (22.2mm)

- Semi-automatic self-colleting tool has automatic clamp/drill/retract cycle.
- Air motor, clamping and retract mechanism are air-operated; feed rate controlled by external hydraulic feed control cylinder.
- Tool has feed stroke of 2.25" (57.2mm); collet stroke of .875" (22.2mm).
- Variable foot spacing is adjustable from 1.00 in. minimum through 3.50 in. maximum.
- Drill point coolant port is provided in pressure foot.
- Trigger lock feature permits tool to cycle without constant operator attention.
- Spindle continues to rotate in forward direction while tool retracts.
- Tool stays clamped to workpiece until operator releases trigger locks.



Model	Stroke		Feed Rate	Weight w/steel foot			Variable Distance	Inlet	Minimum
	Feed	Collet		lbs	kg	Speeds (RPM)	Collet to Drill		Hose Size
120SC-225	2.25 in	.875 in	Min. 1 min. per in.	13.0	5.89	270, 470, 700, 900,	Min: 1 in (25.4mm)	.375" NPT	.5"
	(57mm)	(22.2mm)	Max. 5 sec. per in.			1150, 2200, 3500,	Max. 3.5 in (89mm)		(12.7mm)

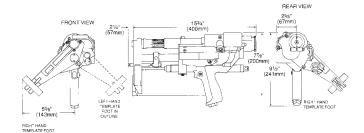
Rated tool performance at 90 PSIG measured at toll inlet with motor running

- toll inlet with motor running.

 NFORMATION REQUIRED FOR ORDERING

 HE COLLIFRO DELIVED IF SEAT INFORMATION REQUIRED FOR ORDERING

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- FOOT TYPE REQUIRED:
 Template Foot Right Hand OR Left Hand
 Jig Collet Foot Depth Sensing
 OR Non-Depth Sensing
 Dril Lock Bushing Foot 21000 series
 OR 22000 Series Bushing

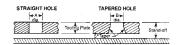


Drill Jig Collet Foot Model

Drill of Collet Foot Model
The 120SC-E-225 G-Matic Drill is available with a jig collet
foot, either with or without a depth sensing sleeve, for use
with nigid tooling plates which have STRAIGHT locating
holes or back TAPERED locating holes. This attachment
with a bullt-in sensing sleeve, will sense variations up to
.125" in the distance between the work surface and the top
of the tooling plate, which allows production drilling of holes
with a countersink to precise limits. A port has been
provided in the foot to deliver coolant to the drill point.

Drill Lock Bushing Foot Model

The versatile Q-Matic 120SC-E-225 Drill is available with a foot which accepts standard 21000 and 22000 series lock-type drill bushings. This foot design increases the versatility of the Q-Matic Drill so that it may be locked onto the rigid tooling plate using various drill bushing tips and their accessories.



INFORMATION REQUIRED TO ORDER JIG COLLET FOOT TOOLS:
(1) Specify tooling plate hole size—diameter A or B—in order to determine collet size (see standard collet size chart).

- (2) When ordering depth sensing models, specify stand-off distance, (Top of tooling plate to work surface) (3) When ordering for straight hole tooling plates, specify tooling plate thickness.

STANDARD COLLET SIZES

Depth Sensing	Straight Hole A dia. 1.000 .875	Tapered Hole .B dia. .796 .670
Non-Depth Sensing	1.000 .875 .750 .625	.796 .670 .640 .500

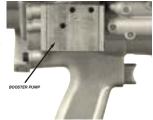
Special collets available upon request.

4-40 4-41

120SC-225 Q-Matic Self-Colleting Drill Motor

Booster Pump Assembly

For increased clamping and feed force, an optional Booster Pump (Part No. 621950) is available. The pump provides extra clamp and feed force when drilling Titanium or taper drilling applications. The Booster Pump assembly will increase both clamp and feed forces by a factor of 2.5. The pump is easily installed on the C-Matic Drill by replacing the cover supplied with the Booster Pump using the three screws supplied with the pump.



Mist Lubricator Assembly

A mist lubricator assembly is available to introduce coolant and air to the cutter. The lubricator is actuated by air from the accessory air tap on the motor side and only functions when the motor is running. The standard mist lubricators (Part No. 641109 and 641081) are filled with a hand pump. The optional mist lubricators (Part No. 641110 and 641082) are filled by a pressure pump.





Jig Collet Foot Attachments

Depth Sensing Jig Collet Foot

Depth sensing jig collet foot is used for accurately drilling and countersinking hole layouts utilizing a simple fixture plate. The cutter passes centrally through the drillmotor collet to produce holes concentric with the fixture plate holes. The depth sensing sleeve will drill and accurately countersink with fixture-to-workpiece variations of up to .125°. Coolant and air blast port is fitted to the foot. User must specify template hole and drill-countersink size as well as drill-countersink configuration.

Non Depth Sensing Jig Collet Foot

Non depth sensing jig collet foot is similar to the above foot without depth sensing capability. This foot is used for straight drilling applications where "rough" depth sensing only is required. This foot grips straight shank drills utilizing an "O-W" type collet.

User must specify template hole and drill size.

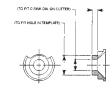
TEMPLATE BUSS NOTE: WHEN ORDERING TOOLS, TEMPLATE BOSSES MUST BE SPECIFIED.

With .200 Boss Length Boss Length Template Hole Dia. Sink Dia. .500 375 624087 623896 .625 623708 623897 .500 .750 623720 623898 .875 .750 623716 623899 1.000 .781 1.000 .875 624034

Template Boss

TO ACCOMODATE TEMPLATE THICKNESS: USE .150 LENGTH FOR TEMPLATE UP TO .125 USE .200 LENGTH FOR TEMPLATE UP TO .187

NOTE: TEMPLATE BOSS LENGTH MUST EXCEED TEMPLATE

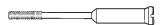


Collets and Mandrels

Collets and Mandrels are supplied as standard equipment with each tool and must be specified when ordered.







Typical Configuration of Mandrels for hole sizes up to .375 in.

INFORMATION NECESSARY TO ORDER COLLETS AND MANDRELS HOLE SIZE AND COLLET LENGTH CODE EXAMPLE: Application is to drill a 375 dia. hole in 500 thick material using a template with a thickness of .130 in. SELECT Template Boss (See Template Boss Length information above). This application requires a 200 length, Using Material Thickness (or pRange chart basel or .500 material thickness, the collet and mandrel Length Code is ETHER .450 or -400.

Hole Collet Length Code ORDER: .375-90 collet/mandrel

Mat					
Using .10 Boss I			Using .200 Boss Length		
Min	Max	Min	Max		
.00	.59	.00	.54	63	
.05	.84	.00	.79	90	
.30	1.09	.25	1.04	115	
.55	1.34	.50	1.29	140	
.80	1.59	.75	1.54	163	
1.05	1.84	1.00	1.79	190	
1.30	2.09	1.25	2.04	215	
4 55		4 50	0.00	0.40	

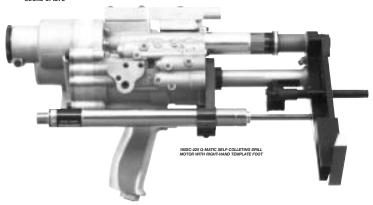
4-43 4-42

Drill Capacity: .5625" (14.3mm) Countersink Capacity: .875" (22.2mm)

Feed Stroke: 2.25" (57.2mm) Clamp Stroke: .875" (22.2mm)

- Semi-automatic self-colleting tool has automatic clamp/drill/retract cycle.
- Air motor, clamping and retract mechanism are air-operated; feed rate controlled by external hydraulic feed control cylinder.
- Tool has feed stroke of 2.25" (57.2mm); collet stroke of .875"
- 180SC-225 Q-Matic Self-Colleting Drill Motor

 Wariable foot spacing is adjustable from 1.00 in. minimum through 3.50 in. maximum.
 - Drill point coolant port is provided in pressure foot.
 - Trigger lock feature permits tool to cycle without constant operator attention.
 - Spindle continues to rotate in forward direction while tool retracts.
 - Tool stays clamped to workpiece until operator releases trigger locks.

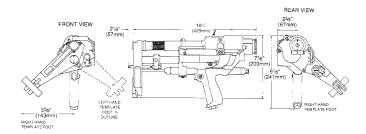


Model	Stroke		Feed Rate Weight	Weight w/steel foot		Variable Distance	Inlet	Minimum	
	Feed	Collet		lbs	kg	Speeds (RPM)	Collet to Drill		Hose Size
180SC-225	2.25 in (57mm)	.5 in (12.5mm)	Min. 1 min. per in. Max. 5 sec. per in.	14.5	6.52	240, 420, 650, 850 1050, 2000, 3100 4900, 6300, 12500,	Min: 1 in (25.4mm) Max. 3.5 in (89mm)	.375" NPT	.5" (12.7mm)

Rated tool performance at 90 PSIG measured at toll inlet with motor running.

4-44

- FOOT TYPE REQUIRED:
 Template Foot Right Hand OR Left Hand
 Jig Collet Foot Depth Sensing
 OR Non-Depth Sensing
- Drill Lock Bushing Foot 21000 series OR 22000 Series Bushing

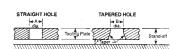


Drill Jig Collet Foot Model

Drill of Collet Foot Model
The 1805C-225 C-Matic Drill is available with a jig collet
foot, either with or without a depth sensing sleeve, for use
with rigid tooling plates which have STRAIGHT locating
holes or back TAPERED locating holes. This attachment
with a built-in sensing sleeve, will sense variations up to
.125" in the distance between the work surface and the top
of the tooling plate, which allows production drilling of holes
with a countersink to precise limits. A port has been
provided in the foot to deliver coolant to the drill point.

Drill Lock Bushing Foot Model

The versatile Q-Matio 180SC-225 Drill is available with a foot which accepts standard 21000 and 22000 series lock-type drill bushings. This foot design increases the versatility of the Q-Matic Drill so that it may be locked onto the rigid tooling plate using various drill bushing tips and their accessories.



INFORMATION REQUIRED TO ORDER JIG COLLET FOOT TOOLS:
(1) Specify tooling plate hole size—diameter A or B—in order to determine collet size (see standard collet size chart).

- (2) When ordering depth sensing models, specify stand-off distance. (Top of tooling plate to work surface) (3) When ordering for straight hole tooling plates, specify tooling plate thickness.

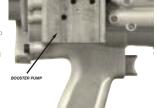
STANDARD COLLET SIZES

Depth Sensing	Straight Hole A dia. 1.000 .875	Tapere Hole .B dia .796 .670
Non-Depth Sensing	1.000 .875 .750 .625	.796 .670 .640 .500
Special collets availal	ble upon re	quest.

180SC-225 Q-Matic Self-Colleting Drill Motor

Booster Pump Assembly

For increased clamping and feed force, an optional Booster Pump (Part No. 621950) is available. The pump provides extra clamp and feed force when drilling Titanium or taper drilling applications. The Booster Pump assembly will increase both clamp and feed forces by a factor of 2.5. The pump is easily installed on the Q-Matto Drill by replacing the cover supplied with the too with the Booster Pump using the three screws supplied with the pump.



Mist Lubricator Assembly

A mist lubricator assembly is available to introduce coclant and air to the cutter. The lubricator is actuated by air from the accessory air tap on the motor side and only functions when the motor is running. The standard mist lubricators (Part No. 641109 and 641081) are filled with a hand pump. The optional mist lubricators (Part No. 641110 and 641082) are filled by a pressure pump.

	Standard	Large
Manual Fill	641109	641081
Pressure Fill	641110	641082



Jig Collet Foot Attachments

Depth Sensing Jig Collet Foot

Depth Sensing Jig Collet Foot

Depth sensing jig collet foot is used for accurately drilling and
countershiring hole layouts utilizing a simple fixture plate. The cutter
passes centrally through the drillmotor collet to produce holes
concentric with the fixture plate holes. The depth sensing seleeve will
drill and accurately countersink with fixture-to-workpiece variations
of up to .125°. Colent and air blast port is fitted to the foot.
User must specify template hole and drill-countersink size as
well as drill-countersink configuration.



Non depth sensing ig gotlet foot is similar to the above foot without depth sensing capability. This foot is used for straight drilling applications where "rough" depth sensing only required. This foot grips straight shank drills utilizing an "O-W" type collet.

User must specify template hole and drill size.



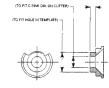
Template Boss



Applica	tion	Template Boss Part No.			
B C Template Sink Hole Dia. Dia.		With .150 Boss Length	With .200 Boss Length		
.500	.375	624087	623896		
.625	.500	623708	623897		
.750	.625	623720	623898		
.875	.750	623716	623899		
1.000	.781	623725			
1.000	.875	624034			



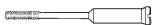
NOTE: TEMPLATE BOSS LENGTH MUST EXCEED TEMPLATE



Collets and Mandrels

Collets and Mandrels are supplied as standard equipment with each tool and must be specified when ordered.





Typical Configuration of Collets for hole sizes up to .375 in.

Typical Configuration of Mandrels for hole sizes up to .375 in.

INFORMATION NECESSARY TO ORDER COLLETS AND MANDRELS HOLE SIZE AND COLLET LENGTH CODE EXAMPLE. Application is to drill a 376 da. hole in. 500 thick material using a template with a thickness of .130 in. SELECT Template Boss (See Template Boss Length information above). This application requires a 200 length. Usi Material Thickness for Plange char busined on 500 material thickness, the collet and mandrel Length Code is ETHER -43 or ~90.

ORDER:	375-63	or	.375-90 collet/mandrel
	Hole A Collet	_	
	Size J Length	_	

Mat	Material Thickness Grip Range							
Using .10 Boss I			Using .200 Boss Length					
Min	Max	Min	Max					
.00	.59	.00	.54	63				
.05	.84	.00	.79	90				
.30	1.09	.25	1.04	115				
.55	1.34	.50	1.29	140				
.80	1.59	.75	1.54	163				
1.05	1.84	1.00	1.79	190				
1.30	2.09	1.25	2.04	215				
1 55	0.24	1.50	2.20	240				

4-47 4-46

Mist Lubricator Assemblies

- Light-weight, self-contained unit features positive pressure, metered flow to drill point.
- Unit has lubricant capacity for 2000 holes without refilling.
- System is automatically activated when tool is in drill cycle, continues to supply lubricant to drill point until trigger is released.
- Position of drill has no affect upon unit supplying lubricant.
- Unit has adjustable flow control valve for metering lubricant flow.
- Mist lubricator is easily refilled from a 2 quart external lubricant pump fill reservoir (622900).
- Universal design fits all Quackenbush self-colleting tools.



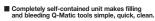
MANUAL FILL MIST LUBRICATOR ASSEMBLY SHOWN MOUNTED ON MODEL 136SC-B-118TF

ORDERING INFORMATION

Mist Lubricator for Quackenbush Tools	Manual Fill	Pressure Fill	
10 QNPD	631887	631888	
136 SC Standard Capacity	631878	631879	
136 SC Large Capacity	631878	631880	
15SC & 153SC Standard Capacity	631881	631882	
15SC & 153SC Large Capacity	631883	631884	
120SC & 180SC Standard Capacity	641109	641110	
120SC & 180SC Large Capacity	641081	641082	

QUACKENBUSH"





- Closed loop hydraulic system keeps fluid loss at a minimum.
- Clear tubing in return line makes air bubbles visible.
- Returned fluid is filtered before entering reservoir, ensuring fluid is free of contaminants.
- Hydraulic hose, pendant control are bundled together for easy, convenient use.
- Pump reservoir has 2 quart (1.91 L) capacity, can service up to 70 refills for 15QNPD; 30 refills for 136SC-112 and 25 refills for 15SC-112.

Model	Code No.	Fluid Pressure	Current	Amp. Draw @115V	Weight
Q-Matic Hydraulic Filler/Bleed Unit	621989	200psi	115V/AC 50/60 cycle	9.5 amps	29 lbs. (13.1 kg)

Notes	 Notes



Cooper Power Tools

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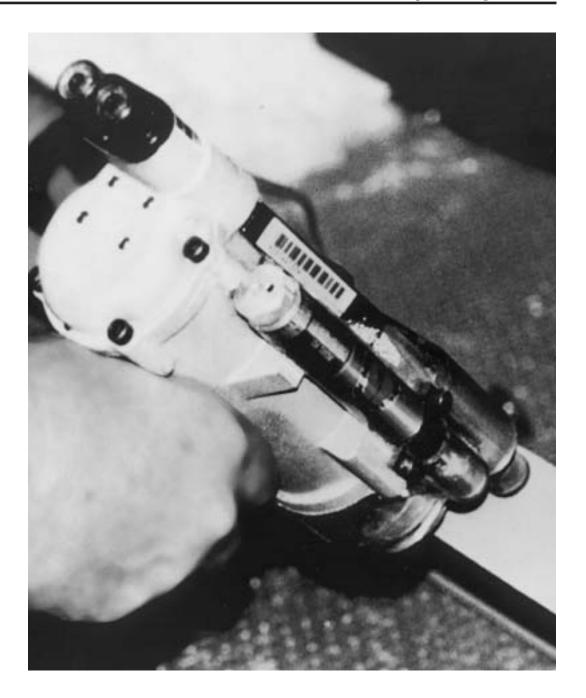
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Introduction

Specialty Tools

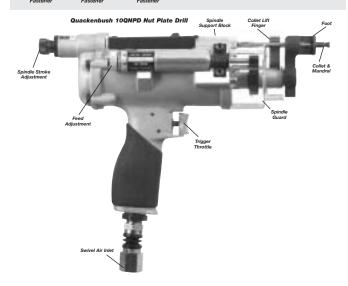
Advanced Drilling Equipment from Cooper Power Tools is the most complete and comprehensive line of drilling systems available to the aerospace industry. This includes a line of specialty drills that are designed to help manufacturers accomplish specific tasks with tools that have been developed or modified to meet the unique requirements of the industry.

An example is the Nut Plate Drill designed to accommodate the nut plate fastener that is used in countless applications in aircraft manufacturing – out on the wings, in the fuselage, beneath the cockpit, in the lavatories and overhead bins – including where there is a need for repeated access to facilitate periodic inspections and maintenance.

flickey Mouse Double Wing Single Wing Foot Foot Foot

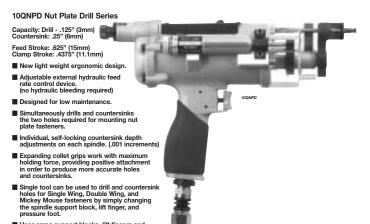
fickey Mouse Double Wing Single Wing Fastener Fastener Fastener

Typically, any structure requiring the use of nut plate fasteners is designed with pre-spaced, pre-drilled holes. The location and size of these holes is determined by the type of nut plate fastener required. The collet/mandrel assembly of the nut plate drill is inserted into a pre-drilled hole which allows for the precision drilling of the two holes required for attaching Single Wing, Double Wing and Mickey Mouse. Our nut plate drills can drill holes for all three types of nut plate fasteners by simply changing the spindle support block, lift finger and pressure foot.





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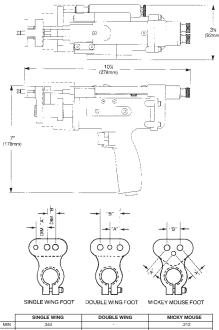
■ Uses same support blocks, lift fingers and pressure feet used with the 15 QNPD tools.

5-4

- Available in 600 and 6000 rpm models with easy gear box conversions. (no increase in tool length)
- Variable spindle-to-spindle spacing provides wide range from minimum of .300 in. to 1.000 in. maximum in .001 increments.
- Fixed spindle spacings up to 1.125 in. are available.
- 10 QNPDM "Mini" nutplates availalbe in 6000 RPM model.

 Minimum spindle to spindle spacing for "mini" is .219"

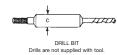
Model	Stroke		weight	Spindle Speeds (RPM)	Inlet	Min. Hose Size
10QNPD	Feed Stroke .60 in. (15mm) Clamp Stroke: 7/16 in. (11mm)		5.0 lbs. (2.26kg)	600, 6000	.375 in. NPT	.375 in.
Mandrel Drills are not supplied with tool. Rated tool performance a 90 PSIG measured at tool inlet with motor running.		BOO In fa MIST	DNAL EXTRA CHARGE AC STER PUMP ASSEMBLY creases both clamp and ctor of 2.5 LUBRICATOR ASSEME volant and air to the cutt	f: 621482 feed forces by a 8LY: Introduces	HAND FILL: 621972 PRESSURE FILL: 621973	



		SINGLE WING	DOUBLE WING	MICKT MOUSE
"A" MIN		.344	-	.212
_ ^	MAX	.679	-	.500
"B"	MIN	.312	.343	.300
"	MAX	1.000	1.125	1.000

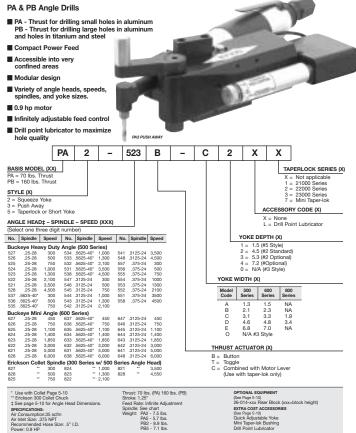
INFORMATION NECESSARY TO ORDER NUT PLATE DRILL



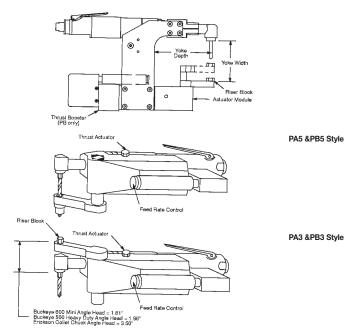


Specialty Tools Specialty Tools









TOOL SELECTION:

- 1. The PA is suitable for drilling aluminum to 1/4* diameter. Use the PB for larger holes in aluminum and for drilling titanium, inconel, steel, etc.
 2. If space permits, the collet spindle is generally preferred because conventional straight shark drill bits can be used and cutter nuncul is minimal.
 3. Use the compact angle if space constraints require it.

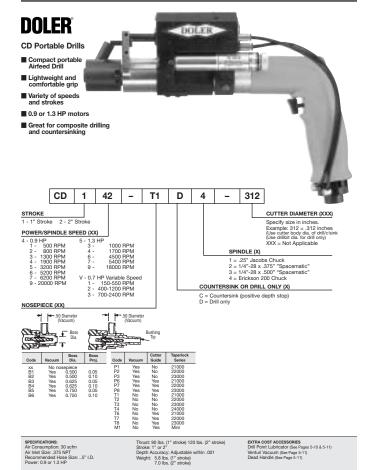
 The tomet heat engage is necessal used for other it.

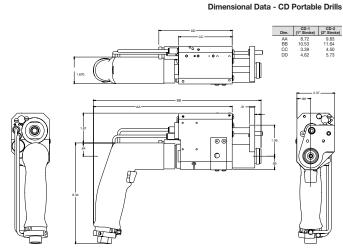
- The toggle thrust actuator is normally used for slow speed drilling where cycle times are relatively long.
 Drill point lubrication will normally improve hole quality and extend cutter life (see page 5-11). Use bendable steel tubing from PL500 luber to drillpoint.

5-6 5-7

Specialty Tools







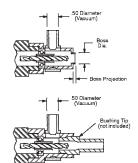
Template Boss

Cutter Guide Bushing is mounted in a sealed ball bearing which greatly reduces wear, extends bushing life and maintains hole accuracy.

The vacuum port connects to a central vacuum system, or rine vacuum port corinects to a central vacuum system, or shop vacuum, or the optional Doler Ventrii Vacuum (pg. 5-11). The Template Boss is used with a Strip Template to locate the drill point. The Boss must extend through the Template and contact the workpiece to maintain accurate countersink depths.

Taper-Lok Nosepiece

Miri Twistlock (pg. 5-11) or Taper-Lok with or without cutter guide, with or without a vacuum port.
When using a cutter guide, enlarge the I.D. of the Bushing Tip to avoid cutter contact. Normally used with PCD cutters.
See pages 1-3 for Taper-lok Fixturing.



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Specialty Tools Specialty Tools

QUACKENBUSH

60QBSF-5 Back Spotfacer

Capacity (Diameter): Aluminum – 1.18" (30mm) Titanium – .75" (20mm) Steel – .75" (20mm)

- Precision spot facing, countersinking, or counterboring of the rear side of a hole.
- Smooth and easy operation. Insert pilot (spindle) thru hole. Reach around and lock cutter on to pilot.

Manually squeeze feed levers to pull cutter into workpiece.

- Micrometer depth adjustment
- Maintains distance from front surface to spot face.
- Variety of bayonet cutters order separately from back page
- Note: Cutters must be left hand cut if acquired from another supplier



SPECIFICATIONS: Air Inlet = 1/4 NPT Weight = 4.9 lbs (2.2 Kg)	Max. Stroke = .4 inch (10 mm) Depth Repeatability = within .001 inch (0.025 mm)	GENERAL INFORMATION: Order Pilot Spindle & Cutter separately:	Operators must understand and follow Safety Practices at all times.
Air Consumption = 30 CFM (850 I/Min)			

QUACKENBUSH

70QVBSF-7 Back Spotfacer

Capacity (Diameter): Aluminum – 1.18" (30mm) Titanium – .75" (20mm) Steel – .75" (20mm)

- Precision spot facing, countersinking, or counterboring of the rear side of a hole.
- Smooth and easy operation.
 Insert pilot (spindle) thru hole.
 Reach around and lock cutter on to pilot

Manually squeeze feed levers to pull cutter into workpiece.

- Governed variable speed motor
- Micrometer depth adjustment
- Maintains distance from front surface to spot face.
- Variety of bayonet cutters order separately from back page
- Note: Cutters must be left hand cut if acquired from another supplier



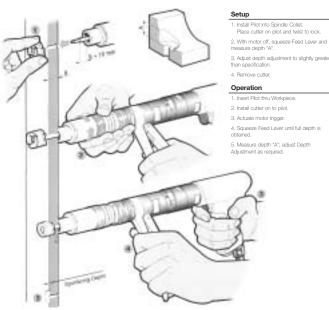
Specialty Tools

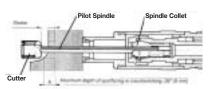
ols: Cutter - 31300250 Pilot - 31400125

31300425

31300450*

Specialty Tools Back Spotfacers Back Spotfacers Accessories

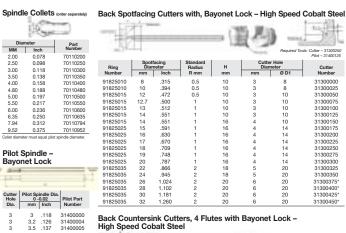


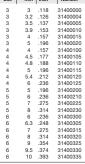


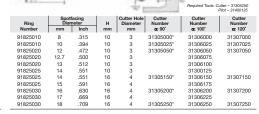
Ordering Information

When ordering a Quackenbush Back Spotfacer tool, it is necessary to also order the Spindle Collet, Plot Spindle and Cutter. These parts are not automatically shipped with the tool.

- Specify Tool Model Number
- Specify Spindle Collet Part Number
 (Note: Collet diameter must equal Plot Spindle diameter)
- 3. Specify Pilot Spindle Part Number
- 4. Specify Cutter Number.



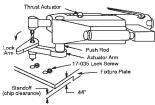




5-12 5-13

Specialty Tools Accessories

PA-5 with Mini-Twistlok Bushing Tips

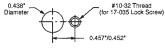


Mini Twistlok Bushing Tip



Part Number: 22-703-XXX Insert the cutter guide diameter for "XXX". Example: 22-700-250 has a .250 guide diameter. Maximum cutter diameter is .313. Miniature version of Taper-lok Bushing Tips.

Fixture Hole Specification for Mini Twistlok



21000 & 22000 Series **Bushing Tips for PA-5**

Similar operation as with Mini-Twistlok Tips. Use industry standard 21000 or 22000 Bushing Tips.

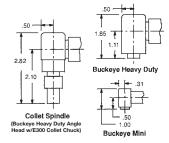


80-070 Quick Adjustable Yoke Width



A special Actuator Arm Assembly is available to provide a wide yoke for workpiece access, but then closes and locks for the drilling operation. The Knob ("A") is adjusted and locked onto Rod ("B") to give required yoke width.

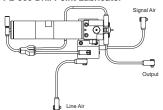
Angle Head Dimensions



Collets for Drills - .5625" - 40 Spindles

Number	Drill Size	Number	Drill Size	Number	Drill Size
1005180	.0625	1006049	49	1006199	29
1005181	.0781	1006316	48	1005967	28
1005182	.0938	1006393	47	1005872	27
1005183	.1094	1005875	46	1006373	26
1005184	.125	1006028	45	1006318	25
1005185	.1406	1006297	44	1006372	24
1005186	.1563	1006394	43	1006315	23
1005187	.1719	1006058	42	1005926	22
1005188	.1875	1005928	41	1005682	21
1005994	60	1005684	40	1005876	20
1006523	59	1006395	39	1006035	19
1006524	58	1006396	38	1005964	18
1006525	57	1006397	37	1005977	17
1006526	56	1006398	36	1006346	16
1006527	55	1006027	35	1006399	15
1006528	54	1005874	34	1006400	14
1006408	53	1006401	33	1005927	13
1006446	52	1006050	32	1005871	12
1006412	51	1005873	31	1006001	11
1005685	50	1003904	30	1005681	10

PL-500 Drill Point Lubricator

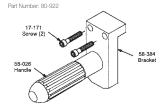


Complete Assembly (including mountig brackets)

85-049 - CD drill 85-045 - PAVPB2 85-046 - PAVPB5

Provides lubricated air to the point of the cutter. Mounts on the side of the CD. Has a quick disconnect fitting for rapid no-mess refilling, use 80-503 Wall Tank to refill or, it can be filled manually and requires no additional equipment.

Dead Handle



Attach directly to Inner Housing to provide for two-handed operation.

Mini Twistlok Bushing Tip

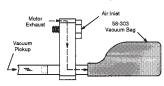


Part Number: 22-700-XXX

Insert the cutter guide diameter for "XXX". For example: 22-700-250 has a .250 guide diameter. Maximum cutter diameter is .313.

Miniature version of Taper-lok Bushing Tips.

80-919 Venturi Vacuum System



The air motor exhaust is captured and routed thru a venturi port to create a vacuum. This vacuum is then used to pick up dust and small chips that are hazardous to the environment. The dust and chips are collected in a disposable bag.

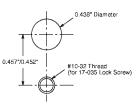
Spindle Adapters (use with Jacobs Chuck)

Part Number: 32-074 For .25"-28 x .375 "Spacematic" cutters.

Special Application Nosepieces

Part No.	Description						
27-135	For drilling seat tracks, without countersinks						
27-136	For drilling seat tracks, with countersinks						

Fixture Hole Specification for Mini Twistlok



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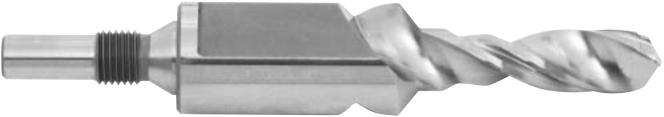
Recoules RC Series are top quality drills, reamers and drill/countersink Cutters for use with Aerospace Drilling Equipment.

Cutter can be made to customer specification, or designed by Recoules for a specific application and tool. Recoules RC Cutters are manufactured to order using precision machinery and highly skilled machinists.

Cutter's manufactured to customer specification are not guaranteed for hole quality unless so stated. For optimum results, Cutter must be used on specified tool, with recommended cutter lubrication, properly installed and managed.

Cutter's will be quoted upon request. Specify quantity(s). Higher quantities will yield lower unit cost. Cutter's cannot be returned for credit unless defective.

Thru-the-Cutter lubrication is best. Lubricant is routed from rear of Cutter, through the flutes and to the cutting edge where it is most beneficial.



For customer-designed cutters, Recoules may have to make minor modifications to accommodate manufacturing equipment. Recoules will advise such with quotation.

For Recoules-designed cutters, the information on page 6-3 must be provided. Sample workpiece materials may also be required.

Refer to page 6-6 for general drilling recommendations.

⊗Recoules[®]



		Cutter Mounting Style	Oil Hole	Type Of Cutter	Ma	utter sterial	Specifi Sou	cation rce	
	Style (See page R-28 for de and Shank - for gripping								
B1 = 1/4 - 28 B2 = 5/16 - 24 B3 = 3/8 - 24 B4 = 7/16 - 20 B5 = 9/16 - 18 B6 = 5/8 - 18 B7 = M6 x 100	External Thread with 12 External Thread with 12	20° taper 20° taper 20° taper 20° taper 20° taper 20° taper 20° taper 20° taper				Cı	ıtter Ma	Custo compl Cutter Applic provid (See pa	fication Source mer Drawing with ete specifications. design by Recoules ation information ed by customer age 6-27 for details)
C1 = M6 x 100 C2 = M8 x 100	External Thread at rear, and square face, stand External Thread at rear,	ard wrench flat with pilot diame	.	, T	pe of C	Mi	crograin	Speed Carbic ge 6-29 f	
$C3 = M10 \times 100$ $C4 = M12 \times 100$ $C5 = M16 \times 100$ $D1 = 5/16-24$ $D2 = 3/8-24$	and square face, stand External Thread at rear and square face, stand External Thread at rear and square face, stand External Thread at rear and square face, stand Pilot diameter at rear, e 60° taper (PET) Pilot diameter at rear, e 60° taper (PET)	with pilot diame ard wrench flat with pilot diame ard wrench flat with pilot diame ard wrench flat xternal thread,	ter	M N P Q R S T U	Drill (Rean Drill - Squa Drill - Full I Short Rean Tape	Only - n Only Rear re Dril Cour Orill + I t Drill - n + Co rlock F	2 Flute - pre-h mer - 2/ Il (Gun I ntersink Ream + + Ream ountersi Ream /	ole requ 4 style Drill) Counte + Cour nk - pre	ired rrsink itersink -hole required pre-hole req'd
E1 = 1/4-28 E4 = 3/8-16 F1 = 1/4-28 F4 = 3/8-16 H2 thru H7	Internal thread with 60° Internal taper & counte E Style Cutters with ste E Style Cutters with ste Similar to C Style exce accept telescoping wee	rbore (Spacemat apped rear diame apped rear diame of wrench flats	ter	Solid or Solid Oil Hole			cutter lu	ubricatio	n)

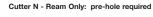
The following mounting styles are not available from CooperTools: Morse Taper, Fluid Chuck, Nutplate

<i>⊗Recoules</i>

Cutters designed by Recoules for a specifc application require the following information:

Customer Identification name or number	Specify quantity or quantities to quote.				
First Workpiece Material and Thickness: Identify first material drilled Aircraft alloy alluminum - advise alloy number Aircraft alloy titanium - advise alloy number Stainless Steel - advise alloy number Mild Steel - hardness less than 28 Re Alloy Steel - Advise alloy number A hardness Composite - advise fiber, resin and properties Other - advise material properties Other - advise material properties	Used on ADE Tool Peck Drill Positive Feed Self Clamping - Variable Spacing Self Clamping - Concentric Collet Portable Self Feed (CD or 21500) Flexified Other_				
Alloy Number	Model Number				
Thickness = maximum (inch or mm)	Type of Lubrication: Water Soluable Coolant Water only				
Second Workpiece Material: Identify second material drilled Use same code as above	Acculube/Boelube type Lubricant None Other - Specify				
Alloy Number	Brand & Type				
Thickness = maximum (inch or mm)					
Additional Materials or Voids: Advise if additional materials or open spaces are included.	Additional information required: Other hole quality parameters such as finish, roundness, straightness. Special conditions or specifications. Taperlock Group and specifications.				
Hole Diameter:					
Advise the exact minimum and maximum acceptable hole diameter - inch or metric					
Min Max					
Countersink - if applicable:					
Advise Countersink maximum diameter and angle:					
Diameter: Min Max					
Angle: Min Max					
Pre-Hole:					
Yes Hole diameter					

Recommendation for requesting Quotation: Photo copy this catalog page. Fill in the blanks for each block. Add any supplemental information needed to completely define the application requirement.



*



Cutter Q - Square Drill (Gun Drill type)



Square Drill is rigid and permits good lubricant and chip flow. Especially good for precision deep holes and good surface finish. Use in positive feed only. Countersink is available.

Cutter S - Full Drill + Ream + Countersink



Full Drill plus Ream plus Countersink is very accurate. Requires relatively long stroke. Drill portion clears workpiece before ream begins. Ream portion is left hand spiral -pushes chip forward and does not damage hole finish or

Cutter U - Ream + Countersink





Recoules puts great emphasis on point geometry and accuracy. Split point is standard. "S" shape point is not available.

Cutters

Cutter Mounting Styles



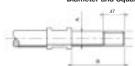
Mounting Style A - Straight Shank



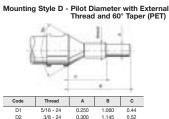
Mounting Style B - Ext'l Thread with 120° Taper



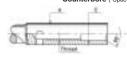
Mounting Style C - External Thread with Pilot **Diameter and Square Face**



Code	Thread	A	В			
C1	M6 x 100	0.244	0.98			
C2	M8 x 100	0.323	1.38			
C3	M10 x 100	0.402	1.38			
C4	M12 x 100	0.480	1.58			
CE	M16 v 100	0.620	4 50			



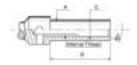
Mounting Style E - Internal Thread with 60° Internal Taper & Counterbore ("Spacematic" Style)



Code	Thread	A	С
E1	1/4 - 28	0.375	0.26
E2	1/4 - 28	0.500	0.26
E3	1/4 - 28	0.625	0.26
E4	3/8 - 16	0.625	0.39

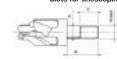
6-4

Mounting Style F - Same as Style E with reduced diameter at rear for Guide Bushing



	-			4
Code	Thread	A	В	С
F1	1/4 - 28	0.375	1.22	0.26
F2	1/4 - 28	0.500	1.22	0.26
F3	1/4 - 28	0.625	1.22	0.26

Mounting Style H - External Thread with Pilot Diameter & Square Face Wrench Slots for telescoping Wrench



Code	Thread	A	В	С		
H2	M8 x 100	0.393	0.63	0.32	Ī	
H3	M10 x 100	0.492	0.78	0.39		
H4	M12 x 100	0.551	0.94	0.47		
H6	M14 x 100	0.630	1.10	0.55		
	1110 100	0.707	4 4 6	0.55		

Cutter V - Taperlock Ream + Countersink

Cutter M - Drill Only

Split Point is standard

0

Cutter P - Drill + Reamer

Cutter R - Drill + Countersink

Drill / Reamer produces very accurate hole in one operation.

Drill plus Countersink produces standard hole and counter sink in one operation. Split Point is standard.

Cutter T - Short Drill + Ream + Countersink

Accurate hole / countersink with minimum stroke. Split point is standard.



Taperlock specifications are based on Briles standards. However, many variations exist and complete specifications are required.

Cutter Mounting Styles

Ceneral Drilling Recommendations

Best Hole Quality

If the variable is the production of the quality of after lub coard

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Cooper Power Tools

P.O. Box 1410 Lexington, SC 29071-1410 USA

Phone: 803-359-1200 Fax: 803-808-6735

Cooper Power Tools

5925 McLaughlin Road Mississauga, Ontario Canada L5R 1B8 Phone: (905) 501-4785 Fax: (905) 501-4786

Cooper Power Tools SAS

Zone industrielle – B.P. 28 77831 Ozoir-la-Ferrière Cedex France

Téléphone: +33-1-6443-2200 Téléfax: +33-1-6440-1717

Cooper Power Tools de México S.A. de C.V.

Libramiento La Joya Esquina Av. Politecnico Y Calle San Blas

Bodega #2, Col. Barrio San Jose Cuautitlan, Edo. de México 54870

Tel: +52-55-5899-9510 Fax: +52-55-5870-5012

Cooper Tools Industrial Ltda.

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Brazil

Tel: +55-15-3238-3929 Fax: +55-15-228-3260

Visit us online at www.cooperpowertools.com

Cooper Power Tools GmbH & Co.

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Fax: +49-7363-810

Cooper Tools Hungária Kft.

Berkenyefa sor 7 H-9027 Györ Hungary

Tel: +36 96 505 300 Fax: +36 96 505 301

Cooper (China) Co., Ltd.

18th Floor Yu An Building 738 Dongfang Road Pudong, Shanghai 200122

China

Phone: +86 21 5831 6805 Fax: +86 21 5831 6762

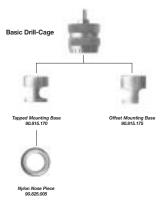


RB 156 M6 x 1 Metric

Bulk:
Shank: Ø 4,8 mm - .188" dia
Tool attachment: M6 x 1
Stroke: 3,5 mm - .1" di
Body off: 25 mm - 1" di
Overall length:
maxi: 55 mm - 2.16"
minit: 51 mm - 2"
Weight: 75 g.

Advantages:
■ Different mounting bases and overall dimensions reduced for very restricted areas.

- Precision:
 Cemented, hardened and ground chrome-nickel steel spindle mounted on a self lubricating bronze body and a ball-thrust bearing.
- Ground centring-cone of the cutter (120°) for perfect concentricity.
- Microstop depth adjustment (1 scale division = .001").
- Safety locking ensured by a locknut equipped with a seal.
 This patented feature allows an easy loosening of the locknut without damage to the drill-cage.

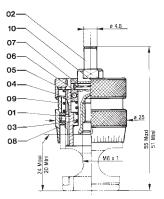




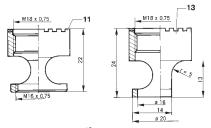


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/5	11 2 M	128	Mon	/ /
/ 45°	1988 X	16) QHe	~ /	Microstop Drill-Cage Assembly Codification
• •	•			10.000.010
•		•		10.000.100

To order, please indicate codification number of the complete drill-cage assembly.



ĺ	Code Reference	REP Index	NB Quantity	Description	
	90.505.005	01	1	BODY	
	90.025.005	02	1	SPINDLE	
	93.430.040	03	1	SPRING	
	90.280.005	04	1	BALL THRUST BEARING	
	90.245.100	05	18	BALL 2 MM DIA	
	93.440.020	06	1	LOCK WASHER	
	91.218.110	07	1	PIN	
	94.215.005	08	1	VERNIER ASSEMBLY	
	93.430.035	09	1	SPRING	
	90.495.005	10	1	LOCKNUT	
	90.815.170	11	1	TAPPED MOUNTING BASE	
	90.825.005	12	12 1 NYLON NOSE PIECE		
	90.815.175	13	1	OFFSET MOUNTING BASE	





For spare parts, please indicate codification number.

7-3 7-2

RB 206 M6 x 1 Metric

Bulk:
Shank: Ø 6 mm - 226" dia
Tool attachment: M6 x 1
Stroke: 6 mm - .236" Body off: Ø 21 mm - .826" dia
Overall length:
maxi: 101 mm - 3.97"
mini: 95 mm - 3.74"
Weight: 110 g.

Advantages:

Different mounting bases and overall dimensions reduced for very restricted areas.

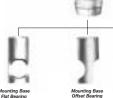
- Precision:

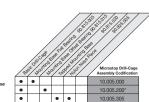
 Cemented, hardened and ground chrome-nickel steel spindle mounted on a self lubricating bronze body and a ball-thrust bearing.
- Ground centring-cone of the cutter (120°) for perfect concentricity.
- Microstop depth adjustment (1 scale division = .001")
- Safety locking ensured by a locknut equipped with a seal.

 This patented feature allows an easy loosening of the locknut without damage to the drill-cage.



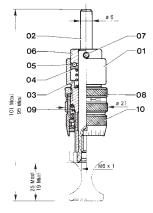




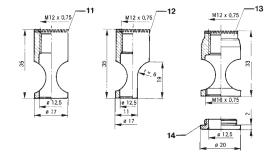


To order, please indicate codification number of the complete drill-cage assembly.

*On request only. For spare parts, please indicate codification number.



Code Reference	REP Index	NB Quantity	Description								
90.505.010	01	1	BODY								
90.025.015	02	1	SPINDLE								
93.430.005	03	1	SPRING								
90.280.010	04	1	BALL THRUST BEARING								
90.245.100	05	18	BALL 2 MM DIA								
93.440.005	06	1	LOCK WASHER								
91.218.230	07	1	PIN								
90.495.010	08	1	LOCKNUT ASSEMBLY								
93.430.045	09	1	SPRING								
94.215.010	10	1	VERNIER ASSEMBLY								
90.815.005	11	1	MOUNTING BASE FLAT BEARING								
90.815.015	12	1	MOUNTING BASE OFFSET BEARING								
90.815.020	13	1	TAPPED MOUNTING BASE								
90.825.005	14	1	NYLON NOSE PIECE FLAT BEARING								



RBI 206 1/4"- 28 Inches

Bulk:
Shank: Ø 6 mm - .226" dia
Tool attachment: 1/4" - 28
Stroke: 6 mm - .236" Body off: Ø 21 mm - .826" dia
Overall length:
maxi: 101 mm - 3.97"
mini: 95 mm - 3.74"
Weight: 110 g.

Advantages:

Different mounting bases and overall dimensions reduced for very restricted areas.

- Precision:

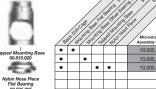
 Cemented, hardened and ground chrome-nickel steel spindle mounted on a self lubricating bronze body and a ball-thrust bearing.
- Ground centring-cone of the cutter (120°) for perfect concentricity.
- Microstop depth adjustment (1 scale division = .001")
- Safety locking ensured by a locknut equipped with a seal.

 This patented feature allows an easy loosening of the locknut without damage to the drill-cage.



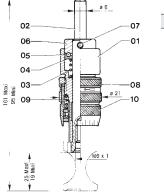




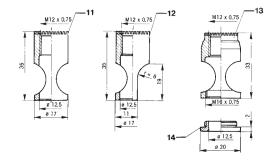


To order, please indicate codification number of the complete drill-cage assembly.

*On request only. For spare parts, please indicate codification number.



Code Reference	REP Index	NB Quantity	Description
90.505.010	01	1	BODY
90.025.016	02	1	SPINDLE
93.430.005	03	1	SPRING
90.280.010	04	1	BALL THRUST BEARING
90.245.100	05	18	BALL 2 MM DIA
93.440.005	06	1	LOCK WASHER
91.218.230	07	1	PIN
90.495.010	08	1	LOCKNUT ASSEMBLY
93.430.045	09	1	SPRING
94.215.010	10	1	VERNIER ASSEMBLY
90.815.005	11	1	MOUNTING BASE FLAT BEARING
90.815.015	12	1	MOUNTING BASE OFFSET BEARING
90.815.020	13	1	TAPPED MOUNTING BASE
90.825.005	14	1	NYLON NOSE PIECE FLAT BEARING



RB 256 M6 x 1 Metric

Bulk:
Shank: Ø 6 mm - 236" dia
Tool attachment: M6 x 1
Stroke: 7,5 mm - .3"
Body off: Ø 28 mm - 1.1" dia
Overall length:
maxi: 98 mm - 3.85"
Weight: 165 g.

Advantages:

Different mounting bases available and reduced overall dimensions.

- Precision:

 Cemented, hardened and ground chrome-nickel steel spindle mounted on a self lubricating bronze body and a ball-thrust bearing.
- Ground centring-cone of the cutter (120°) for perfect concentricity.
- Microstop depth adjustment (1 scale division = .001")
- Safety locking ensured by a locknut equipped with a seal.

 This patented feature allows an easy loosening of the locknut without damage to the drill-cage.

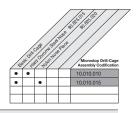






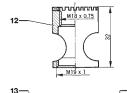
To order, please indicate codification number of the complete drill-cage assembly.

7-8



02 05 06 07--09 107. 104. 16 9 28 10 03 08 26 Maxi 19 Mini

Code Reference	REP Index	NB Quantity	Description								
90.505.020	01	1	BODY								
90.025.025	02	1	SPINDLE								
90.205.280	03	1	BRONZE BUSHING								
93.430.045	04	1	SPRING								
90.280.015	05	1	BALL THRUST BEARING								
90.245.130	06	20	BALL 2,5 MM DIA.								
90.280.020	07	1	BALL THRUST BEARING								
90.013.029	08	1	CIRCLIPS								
90.495.015	09	1	LOCKNUT								
93.430.015	10	1	SPRING								
94.215.015	11	1	VERNIER								
90.815.060	12	1	TAPPED MOUNTING BASE								
90.825.015	13	1	HARD CHROME STEEL NOSE PIECE								
90.825.020	14	1	NYLON NOSE PIECE								





For spare parts, please indicate codification number.

RBI 256 1/4" -28 Inches

Bulk:
Shank: Ø 6 mm - 236" dia
Tool attachment: 1/4" - 28
Stroke: 7,5 mm - .3"
Body off: Ø 28 mm - 1.1" dia
Overall length:
maxi: 98 mm - 3.85"
Weight: 165 g.

Advantages:

Different mounting bases available and reduced overall dimensions.

- Precision:

 Cemented, hardened and ground chrome-nickel steel spindle mounted on a self lubricating bronze body and a ball-thrust bearing.
- Ground centring-cone of the cutter (120°) for perfect concentricity.
- Microstop depth adjustment (1 scale division = .001")
- Safety locking ensured by a locknut equipped with a seal.

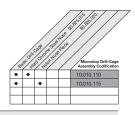
 This patented feature allows an easy loosening of the locknut without damage to the drill-cage.

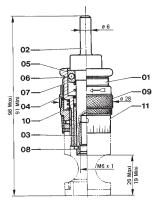




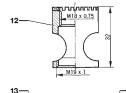


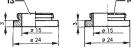
To order, please indicate codification number of the complete drill-cage assembly.





Code Reference	REP Index	NB Quantity	Description								
90.505.020	01	1	BODY								
90.025.095	02	1	SPINDLE								
90.205.280	03	1	BRONZE BUSHING								
93.430.045	04	1	SPRING								
90.280.015	05	1	BALL THRUST BEARING								
90.245.130	06	20	BALL 2,5 MM DIA.								
90.280.020	07	1	BALL THRUST BEARING								
90.013.029	08	1	CIRCLIPS								
90.495.015	09	1	LOCKNUT								
93.430.015	10	1	SPRING								
94.215.015	11	1	VERNIER								
90.815.060	12	1	TAPPED MOUNTING BASE								
90.825.015	13	1	HARD CHROME STEEL NOSE PIEC								
90.825.020	14	1	NYLON NOSE PIECE								





For spare parts, please indicate codification number.

RB 257 M6 x 1 Metric

Bulk:
Shank: Ø 6 mm - 236" dia
Tool attachment: M6 x 1
Stroke: 6 mm - 236"
Body off: Ø 29 mm - 1.141" dia
Overall length:
maxi: 92 mm - 3.62"
wini: 88 mm - 3.46"
Weight: 155 g.

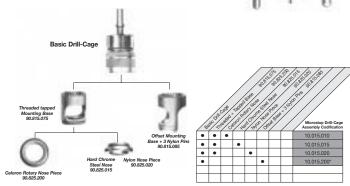
Advantages:

Different mounting bases available and reduced overall dimensions.

- Precision:

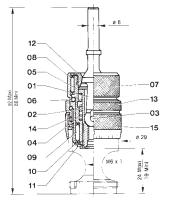
 High precision drill-cage, body in special treated chromed steel, fully ground throughout. This ball mounted drill-cage includes two needle bearings for best utilization.
- Any wrong position of the hand holding the drilling machine is offset by the ball system and it has been specially designed for countersinking and spotfacing perfectly perpendicular to the bearing surfaces and concentric with the reamings of rivet and screw holes.
- Ground centring-cone of the cutter (120°) for perfect concentricity.
- Safety locking of microstop depth adjustment (one scale division = .001")
- Rotation and translation movements separated for best accuracy.



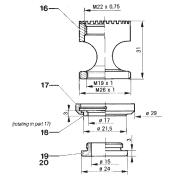


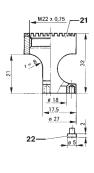
To order, please indicate codification number of the complete drill-cage assembly.

For spare parts, please indicate codification number.



Code Reference	REP Index	NB Quantity	Description
90.025.030	01	1	SPINDLE
91.015.005	02	1	SLEEVE
91.215.010	03	1	PIN
93.430.045	04	1	SPRING
90.620.005	05	1	BUSH
90.245.100	06	31	BALL 2 MM DIA.
90.505.025	07	1	BODY
90.405.295	08	1	NEEDLE CAGE
90.405.165	09	1	NEEDLE CAGE
93.440.010	10	1	WASHER
93.605.050	11	1	CIRCLIPS
90.255.005	12	1	PLUG
90.495.020	13	1	LOCKNUT
93.430.020	14	1	SPRING
94.215.020	15	1	VERNIER ASSEMBLY
90.815.075	16	1	THREADED + TAPPED BASE
90.225.005	17	1	RING
90.825.210	18	1	ROTARY NOSE PIECE
90.825.015	19	1	HARD CHROME STEEL NOSE PIECE
90.825.020	20	1	NYLON NOSE PIECE
90.815.084	21	1	OFFSET MOUNTING BASE
93.045.015	22	3	NYLON PIN





RB 306 M8 x 1 Metric

Bulk:
Shank: Ø 6 mm - 236" dia
Tool attachment: M8 x 1
Stroke: 7,5 mm - .3"
Body off: Ø 28 mm - 1.1" dia
Overall length:
maxi: 98 mm - 3.85"
mini: 91 mm - 3.58"
Weight: 175 g.

Advantages:
■ This cage has been designed for use with cutters of more than .394" dia. (10 mm).

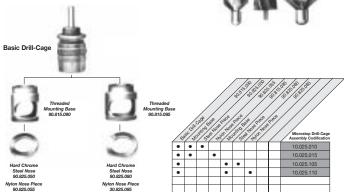
- Precision:

 Cemented, hardened and ground chrome-nickel steel spindle mounted on a self lubricating pronze body and a ball-thrust bearing.
- Ground centring-cone of the cutter (120°) for perfect concentricity.
- Microstop depth adjustment (1 scale division = .001")
- Safety locking ensured by a locknut equipped with a seal.

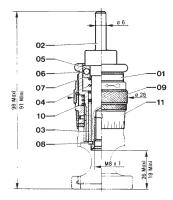
 This patented feature allows an easy loosening of the locknut without damage to the drill-cage.





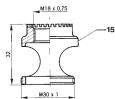


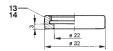
To order, please indicate codification number of the complete drill-cage assembly.



Code Reference	REP Index	NB Quantity	Description
90.505.020	01	1	BODY
90.025.035	02	1	SPINDLE
90.205.280	03	1	BRONZE BUSHING
93.430.045	04	1	SPRING
90.280.015	05	1	BALL THRUST BEARING
90.245.130	06	20	BALL 2,5 MM DIA.
90.280.020	07	1	BALL THRUST BEARING
90.013.029	08	1	CIRCLIPS
90.495.015	09	1	LOCKNUT ASSEMBLY
93.430.015	10	1	SPRING
94.215.015	11	1	VERNIER ASSEMBLY
90.815.090	12	1	THREADED MOUNTING BASE
90.825.050	13	1	HARD CHROME STEEL NOSE PIEC
90.825.055	14	1	NYLON NOSE PIECE
90.815.095	15	1	THREADED MOUNTING BASE
90.825.080	16	1	HARD CHROME STEEL NOSE PIEC
90.825.085	17	1	NYLON NOSE PIECE









For spare parts, please indicate codification number.

RB 307 Metric

Recoules

RB 307 M8 x 1 Metric

Bulk:
Shank: Ø 6 mm - 236" dia
Tool attachment: M8 x 1
Stroke: 7 mm - 275"
Body off: Ø 29 mm - 1.141" dia
Overall length:
maxi: 92 mm - 3.62"
mini: 88 mm - 3.46"
Weight: 155 g.

Advantages:

Different mounting bases available and reduced overall dimensions.

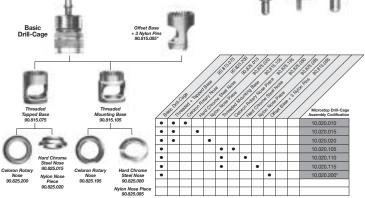
Precision:

■ High precision drill-cage, body in special treated chromed steel, fully ground throughout. This ball mounted drill-cage includes two needle bearings for best utilization.

- Any wrong position of the hand holding the drilling machine is offset by the ball system, and it has been specially designed for countersinking and spotdacing perfectly perpendicular to the bearing surfaces and concentric with the reamings of rivet and screw holes.
- Ground centring-cone of the cutter (120°) for perfect concentricity.

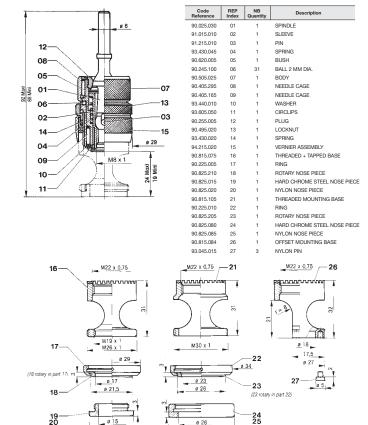
■ Safety locking of microstop depth adjustment (one scale division = .001")





To order, please indicate codification number of the complete drill-cage assembly.

*On request only.



7-16

For spare parts, please indicate codification number.

RBI 307 1/4" - 28 Inches

Bulk:
Shank: Ø 6 mm - 236" dia
Tool attachment: 1/4" - 28
Stroke: 7 mm - 275"
Body off: Ø 29 mm - 1.141" dia
Overall length:
maxi: 92 mm - 3.62"
mini: 88 mm - 3.46"
Weight: 155 g.

Advantages:

Different mounting bases available and reduced overall dimensions.

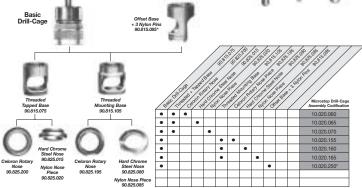
Precision:

■ High precision drill-cage, body in special treated chromed steel, fully ground throughout. This ball mounted drill-cage includes two needle bearings for best utilization.

- Any wrong position of the hand holding the drilling machine is offset by the ball system, and it has been specially designed for countersinking and spotdacing perfectly perpendicular to the bearing surfaces and concentric with the reamings of rivet and screw holes.
- Ground centring-cone of the cutter (120°) for perfect concentricity.

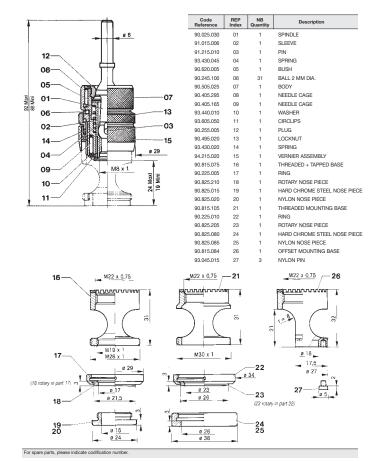
■ Safety locking of microstop depth adjustment (one scale division = .001")





To order, please indicate codification number of the complete drill-cage assembly.

*On request only.



7-18 7-19

RB 406 M10 x 1 Metric

Bulk:
Tool attachment: M10 x 1
Stroke: 14 mm - ,551"
Body off: Ø 36 mm - 1,417" dia
Overall length:
naxi: 163 mm - 6,417"
mis: 136mm - 5,354" Weight: 545 g.

Advantages:
■ This drill-cage has been especially designed for use with cutters of 7/8" to 1 1/2" dia.

■ Different mounting bases available and reduced overall dimensions.

Precision:

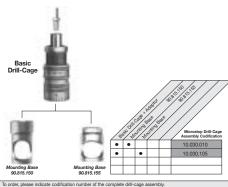
Removable adaptor with two possibilities of use:

A. Chuck-clamping of the straight shank with three wrench flats,

B. Direct fitting on the spindle without using the drill chuck.

This gives perfect concentricity and noticeably reduces the length and weight of the drill-and-tool assembly. Results are higher performance, improved machining and much less fatigue for the operator.

- Cemented, hardened and ground chrome-nickel steel spindle mounted on three needle-bearings and a ball thrust bearing.
- Microstop depth adjustment each scale division corresponding to a displacement of .001".
- Safety locking ensured by a locknut equipped with a seal.
 This patented feature allows an easy loosening of the locknut without damage to the drill-cage.





For Use With M10 x 1 Ground Thread Cutters

Description 90.505.035 SPINDI F 90.025.045 02 93.605.065 CIRCLIPS 90.405.270 04 NEEDLE CAGE 90.280.025 90.245.130 BALL THRUST BEARING BALL 2,5 MM DIA. 06 23 90.280.030 BALL THRUST BEARING 93.430.055 SPRING NEEDLE BEARING 90.615.085 09 90.230.085 10 SEAL RING SEAL RING U-LINK 90.230.120 02 LOCKNUT 90,495,030 13 93.430.030 SPRING 11-VERNIER ASSEMBLY 94,215,030 15 90.815.150 MOUNTING BASE 03 MOUNTING BASE 90.815.155 01 90.005.005 ADAPTOR 04 13 05 06-Ø 07 16 -17 15 163 Maxi 136 Mini MANAGE TO THE STATE OF THE STAT รักการ เกากานโ 14 80 M24 x 0,75 09 10-53 Maxi 26 Mini M10 x 1 ø 25 ø 40

For spare parts, please indicate codification number.

7-20 7-21

Microstop Drill-Cage for Drilling, Reaming and Countersinking

Recoules

RB 356 HP 21 & RB 356 HP 38 M6 x 1 Metric

Bulk:

RB 356 HP 21 Tool attachment: Stroke: Body off: Overall length:

M6 x 1 21 mm - .826" Ø 27 mm - 1.063" dia. maxi: 136 mm - 5.354" mini: 116 mm - 4.567" 300 g.

Weight:

RB 356 HP 38 Tool attachment: Stroke: Body off: Overall length: M6 x 1 38 mm - 1.500" Ø 27 mm - 1.063" dia. maxi: 183 mm - 7.204" mini: 168 mm - 6.614" 375 g. Weight:

- Advantages:
 Mounted on three needle bearings, this high precision drill-cage ensures perfect concentricity.
- Removable adaptor with two possibilities of use:
 A. Chuck-clamping of the straight shank with three wrench flats,
 B. Direct fitting on the spindle without using the drill chuck.
 This gives perfect concentricity and noticeably reduces the length and weight of the drill and tool assembly.
 Results are higher performance, improved machining and much less fatigue for the operator.
- Cemented, hardened and ground chrome-nickel steel spindle mounted on three needle bearings and a ball thrust bearing. Body of specially treated chrome steel.
- Ground centring-cone of the cutter (120°) for perfect concentricity.
- Microstop depth adjustment: (1 scale division = .001").

On request all our cutter attachments can be 1/4" - 28 thread.

7-22

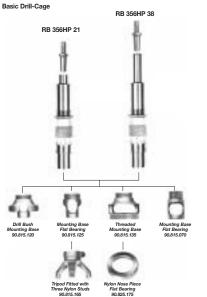
Safety locking ensured by a locknut equipped with a seal. This patented feature allows an easy loosening of the locknut without damage to the drill-cage.





Microstop Drill-Cage for Drilling, Reaming and Countersinking

RB 356 HP 21 and RB 356 HP 38 Metric

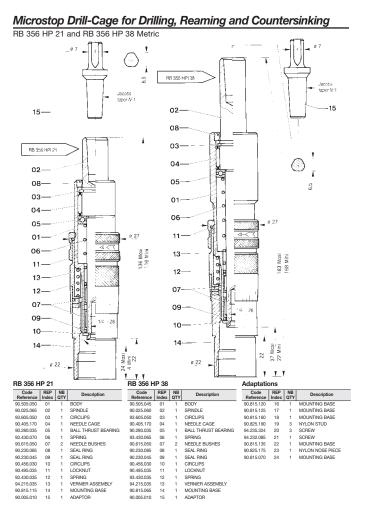


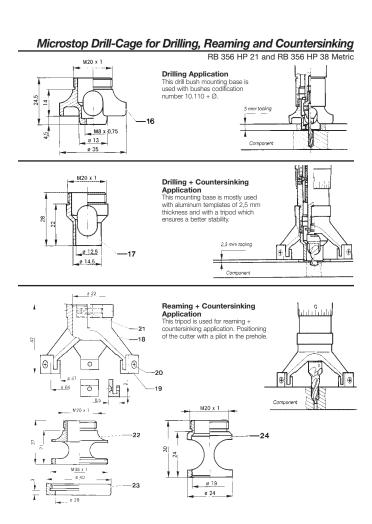


7-23

RB	RB 356 HP 21 /										RB 356 HP 38								
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For spare parts, please indicate codification number.





Microstop Drill-Cage for Drilling, Reaming and Countersinking

Recoules

RB 356 HPI 21 & RB 356 HPI 38 1/4" - 28 Inches

Bulk:

RB 356 HPI 21 Tool attachment: Stroke: Body off: Overall length: 1/4" - 28 F 21 mm - .826" Ø 27 mm - 1.063" dia. maxi: 136 mm - 5.354" mini: 116 mm - 4.567" 300 g. Weight:

RB 356 HPI 38 Tool attachment: Stroke: Body off: Overall length: 1/4" - 28 F 38 mm - 1.500" Ø 27 mm - 1.063" dia. maxi: 183 mm - 7.204" mini: 168 mm - 6.614" 375 g. Weight:

- Advantages:
 Mounted on three needle bearings, this high precision drill-cage ensures perfect concentricity.
- Removable adaptor with two possibilities of use:

 A. Chuck-clamping of the straight shank with three wrench flats,

 B. Direct fitting on the spindle without using the drill chuck.
 This gives perfect concentricity and noticeably reduces the length and weight of the drill and tool assembly.

 Results are higher performance, improved machining and much less fatigue for the operator.
- Cemented, hardened and ground chrome-nickel steel spindle mounted on three needle bearings and a ball thrust bearing. Body of specially treated chrome steel.
- Ground centring-cone of the cutter (120°) for perfect concentricity.
- Microstop depth adjustment: (1 scale division = .001").

On request all our cutter attachments can be 1/4" - 28 thread.

7-26

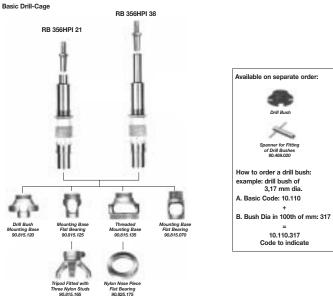
Safety locking ensured by a locknut equipped with a seal. This patented feature allows an easy loosening of the locknut without damage to the drill-cage.





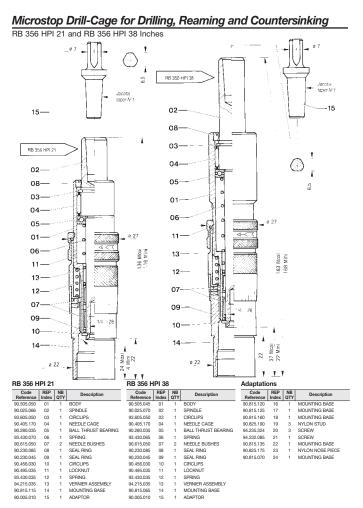
Microstop Drill-Cage for Drilling, Reaming and Countersinking

RB 356 HPI 21 and RB 356 HPI 38 Inches



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For spare parts, please indicate codification number.



Microstop Drill-Cage for Drilling, Reaming and Countersinking RB 356 HPI 21 and RB 356 HPI 38 Inches **Drilling Application**This drill bush mounting base is used with bushes codification number 10.110 + Ø. __ M8 x 0.75 Component ø 35 Drilling + Countersinking Application This mounting base is mostly used with aluminum templates of 2,5 mm thickness and with a tripod which ensures a better stability. M20 x 1 2,5 mini taaling ø 12,5 _6 14,5_ 3 22 Reaming + Countersinking Application This tripod is used for reaming + countersinking application. Positioning of the cutter with a pilot in the prehole. ىلىلىلىلىلىن **,** ⊕ [ʃ 0 0 順 \mathbf{P} Ó M20 x 1 ø 19 -23

7-29

Microstop Drill-Cage for Drilling, Reaming and Countersinking

Recoules

RB 356 HP 58 M10 x 1 Metric

Special for Drill Countersinking Reamers and Taper-Lok Cutters

7-30

Bulk:
Tool attachment: M10 x 1
Stroke: 58 mm - 2.283"
Body off: Ø 38 mm - 1.5" dia
Overall length:
maxi: 292 mm - 11.5"
mini: 264 mm - 10.4"
Weight: 970 g. Code number: 10.050.000

Advantages:
■ Mounted on three needle bearings, this high precision drill-cage ensures perfect concentricity.

- It has been specially designed for drilling, reaming and countersinking operations.
- Removable adaptor with two possibilities of use:

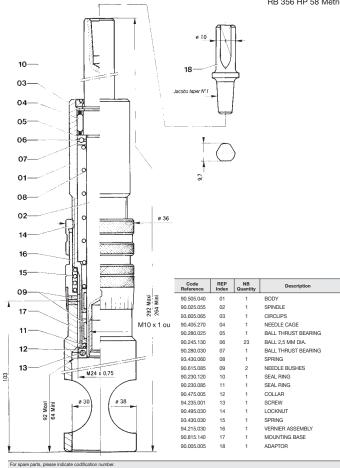
 A. Chuck clamping of the straight shank with 3 wrench flats,

 B. Direct fitting on the spindle without using the drill chuck.
 This gives perfect concentricity and noticeably reduces the length
 and weight of the drill-and-tool assembly.

 Results are higher performance, improved machining and much less
 fatigue for the operator.
- Cemented, hardened and ground chrome-nickel steel spindle mounted on three needle bearings and a ball thrust bearing.
- Body of specially treated chrome steel fully ground throughout.
- Ground centring-cone of the cutter (120°) for perfect concentricity.
- Microstop depth adjustment: (1 scale division = .001").
- Safety locking ensured by a locknut equipped with a seal. This patented feature allows an easy loosening of the locknut without damage to the drill-cage.



Microstop Drill-Cage for Drilling, Reaming and Countersinking



Microstop Drill-Cage for Drilling, Reaming and Countersinking

Recoules

RB 356 HPI 58 7/16" - 20 F Inches

Special for Drill Countersinking Reamers and Taper-Lok Cutters

7-32

Bulk:
Tool attachment: 7/16" - 20 F
Stroke: 58 mm - 2.283"
Body off: Ø 38 mm - 1.5" dia
Overall length:
maxi: 292 mm - 11.5"
min: 264 mm - 10.4"
Weight: 970 g. Code number: 10.050.050

Advantages:
■ Mounted on three needle bearings, this high precision drill-cage ensures perfect concentricity.

- It has been specially designed for drilling, reaming and countersinking operations.
- Removable adaptor with two possibilities of use:

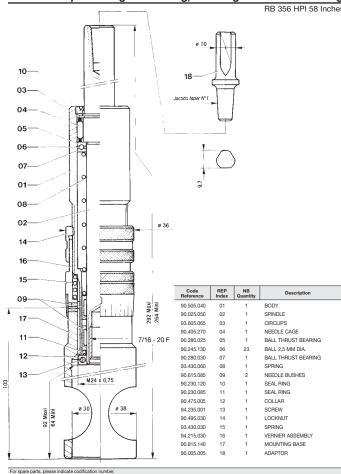
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- Microstop depth adjustment: (1 scale division = .001").
- Safety locking ensured by a locknut equipped with a seal. This patented feature allows an easy loosening of the locknut without damage to the drill-cage.



Microstop Drill-Cage for Drilling, Reaming and Countersinking



Notes	Notes



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